J030-RP
Rev. No. 0

SLF-3/30/92

FINAL DRAFT
ENVIRONMENTAL PRIORITIES INITIATIVE
PRELIMINARY ASSESSMENT REPORT
E L BETH LTD
PREPARED UNDER

WORK ASSIGNMENT NO. 019-2JZZ
CONTRACT NO. 68-W9-0051

MARCH 30, 1992

SUBMITTED BY:

Claire Baruxis
CLAIRE BARUXIS
SITE MANAGER

Gary Rozek
GARY ROZEK
PROJECT MANAGER

Charles ... for RN
RONALD M. NAMAN
SUBCONTRACT OFFICE MANAGER

... for DS
DENNIS STAINKEN, Ph.D.
WORK ASSIGNMENT MANAGER

This Report was conducted under the following USEPA Documentation Procedure

Guidance for Performing Preliminary Assessments Under CERCLA
Publication 9345.0-01A

SITE SUMMARY AND RECOMMENDATION

The E L Beth Ltd Site (E L Beth) is located off of High Street in a light industrial and residential area of Perth Amboy, Middlesex County, New Jersey. The property is bordered to the east by the Arthur Kill, and to the south, west, and north by industrial properties. The adjacent property to the south is also a CERCLIS site. The EL Beth property consists of a 0.66-acre area of land and a pier, approximately 0.41 acre in size, that extends into the Arthur Kill (Ref. Nos. 2; 4, pp. 4, 5; 27; 32). A factory was located on the pier; the factory and pier, as well as company records, were destroyed in a May 1981 fire. The site has been inactive since the time of that fire (Ref. Nos. 3; 4, pp. 3, 4; 6; 7, pp. 8, 15). Figures 1 and 2 present a Site Location Map and a Site Map, respectively.

E L Beth was a foundry and secondary smelting operation that produced solder, casting metals, and lead alloys. Specifically, lead and tin scrap materials were melted and alloyed and cast into ingots. In addition, gold was recovered from electronic scrap (Ref. Nos. 2; 4, p. 5; 7, p. 15; 8, p. 5). The facility reportedly was established in October 1975 under the ownership of M.C. Canfield Sons; in late 1977 the present owners purchased the facility, and operated it as a subsidiary of M.C. Canfield Sons from 1978 until 1981. From 1981 to the present, the property has been in the names of the individual owners. The owners submitted a RCRA Part A permit application in November 1980 indicating that the facility would treat, store, or dispose of hazardous waste (Ref. Nos. 2; 4, p. 1; 8, p. 5).

In May 1981 an on-site fire caused by an overheated kiln destroyed the facility. An earlier fire had occurred on the same tax block in July 1980. The 1980 fire began at a property located southeast of both the E L Beth site and the adjacent CERCLIS site, and spread through much of the block. The 1980 fire spread to the CERCLIS site adjacent to E L Beth; it is not certain, however, whether this fire reached the E L Beth property (Ref. Nos. 28, 32). In March 1983 the owner requested that the facility be delisted as a treatment, storage, or disposal facility; the facility was delisted by the New Jersey Department of Environmental Protection (NJDEP) in February 1985 (Ref. Nos. 3; 5; 6; 7, p. 15). NJDEP inspectors noted in January 1985 and June 1990 that hazardous materials were not being stored on site at the times of those inspections (Ref. Nos. 4, 5, 7). No wastes in containers are presently stored at the E L Beth site. However, much rubble, including a few burned or rusted drums, is now present at the fire-damaged factory and pier (Ref. No. 8, p. 4; see also photographs in Attachment 1).

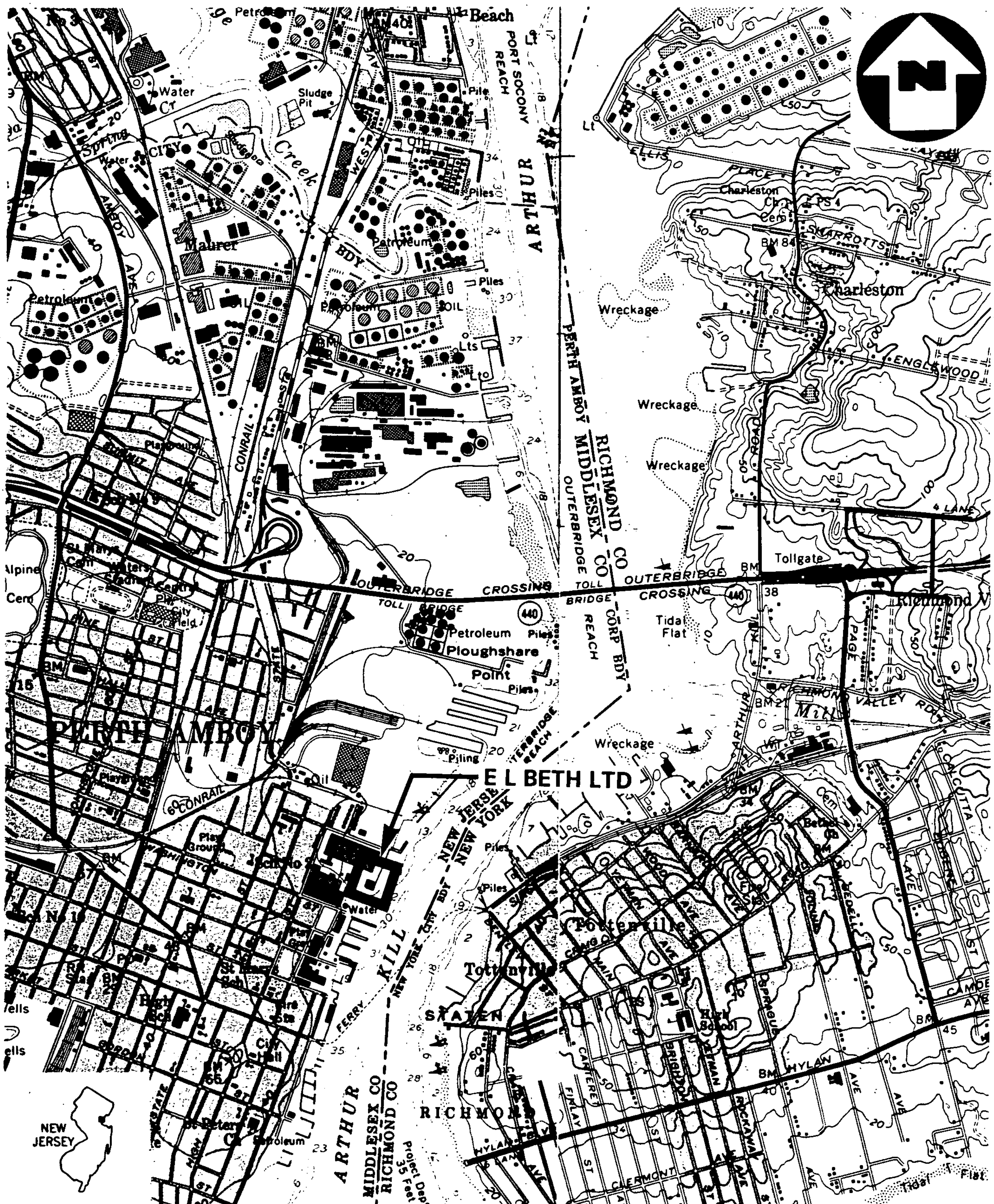
According to the facility's Hazardous Waste Permit Application, the wastes that were generated were corrosive materials and emission control dust/sludge from secondary lead smelting. "D000" waste was also reported. (It is not known what the applicant intended by the use of the designation "D000".) Wastes were reportedly contained in drums on concrete, outdoors and indoors (Ref. Nos. 2; 8, pp. 4, 5, 7; 29). During an on-site reconnaissance conducted by HALLIBURTON NUS Environmental Corporation on March 4, 1992, imprints of approximately 10 drums were noted in blacktop at the site, near the shoreline along the south property boundary (Ref. No. 8, pp. 4, 7; see also photograph No. 1P-12 in Attachment 1). In the November 1980 permit application, the owner reported an estimated annual quantity of 50,000 pounds of hazardous wastes in drums, and a process design capacity of 2,500 gallons (Ref. Nos. 2, 9). Available information indicates that no hazardous waste transportation manifests were generated by the facility after 1980. The owner informed an NJDEP inspector that wastes may have been transported to his new industrial facility in Edison, New Jersey prior to the 1981 fire. The NJDEP inspector noted that this action would have represented a violation of hazardous waste transportion regulations, but recommended no enforcement action. It is not known whether any hazardous wastes were present on site at the time of the May 1981 fire (Ref. Nos. 4, pp. 3, 4; 5; 28).

The former drum storage areas, and the large amount of debris now present at the fire-damaged factory and pier, represent a potential for contaminant migration to the Arthur Kill, which is considered to be a sensitive environment and in which limited fishing may be conducted (Ref. Nos. 21, 23 through 26). Contaminant migration to the Arthur Kill is favored by overland migration across the paved surface of the site, storm sewer discharge, and the proximity of the pier to the water surface. Particulates and other air contaminants potentially present could reach nearby worker and residential

SITE SUMMARY AND RECOMMENDATION (CONTD)

populations, and sensitive environments. It is not likely that contaminants would reach an aquifer that supplies potable water, as the site reportedly was paved prior to E L Beth activities. The nearest known potable water supply wells are located more than 2 miles from the site and are separated from the site by the Raritan River. During a HALLIBURTON NUS Environmental Corporation on-site reconnaissance that was conducted on March 4, 1992, it was noted that the site is not entirely fenced; the presence of graffiti indicates that outsiders have access to the property.

The E L Beth Site is recommended for a **SCREENING SITE INSPECTION** based upon the following: the possibility that wastes formerly stored in drums on site may have been released to the Arthur Kill; contaminants may be present in debris at the fire-damaged pier, and could readily migrate to the Arthur Kill; and the potential for air migration of contaminants that may be present in debris to affect nearby workers and residents. The Arthur Kill represents a concern with respect to both sensitive environments and human food chain considerations. Surface water and/or sediment sampling is recommended, as well as removal of the debris that is now present at the pier.

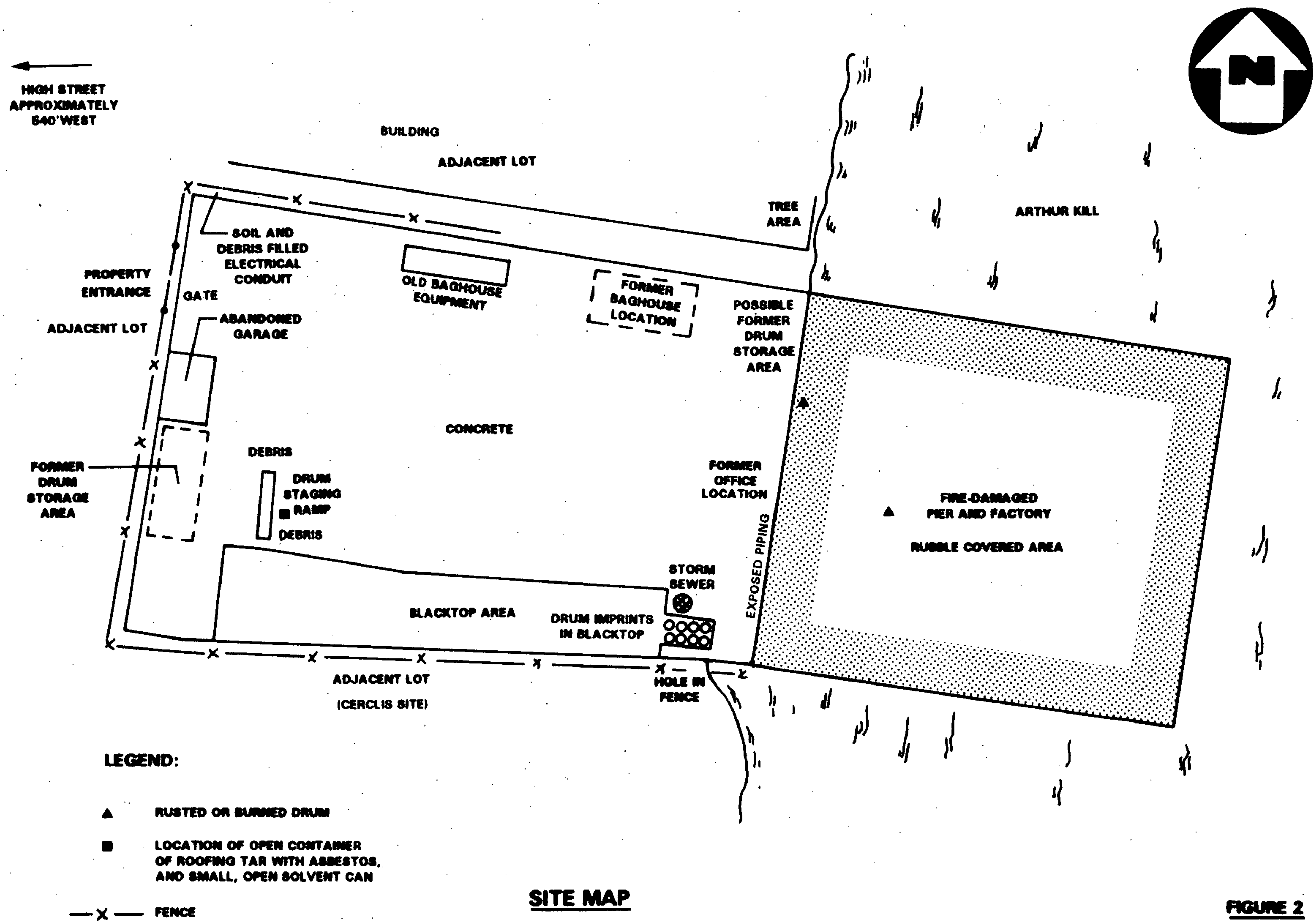


(QUAD) PERTH AMBOY, NY-NJ

SITE LOCATION MAP
E L BETH LTD
PERTH AMBOY, N.J.

FIGURE 1

SCALE: 1" = 2000'



SITE MAP

E L BETH LTD

PERTH AMBOY, N.J.

(NOT TO SCALE)

FIGURE 2

J030-RP
Rev. No. 0

SITE ASSESSMENT REPORT: SITE INSPECTION

PART I: SITE INFORMATION

1. Site Name/Alias E L Beth Ltd

   Street 500 High Street

   City Perth Amboy State New Jersey Zip 08861

2. County Middlesex County Code 023 Cong.Dist. 06

3. CERCLIS ID No. NJD067484923

4. Block No. 238 Lot No. 4 and 4.18

5. Latitude 40° 30′ 46" N Longitude 74° 15′ 34" W

   USGS Quad. Perth Amboy

6. Approximate size of site 1.07 acres

7. Owner Robert Silverman and Jack Silverman Tel. No. (201) 379-9447

   Street 23 Audubon Court

   City Short Hills State New Jersey Zip 07078

8. Operator (Same) Tel. No. ______

   Street ______

   City ______ State ______ Zip ______

9. Type of Ownership

   X Private _ Federal _ State

   _ County _ Municipal _ Unknown _ Other ______

10. Owner/Operator Notification on File

    X_ RCRA 3001 Date 10/9/80 _ CERCLA 103c Date ______

    _ None _ Unknown

11. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments
RCRA Part A	N/A	1980	N/A	Site delisted in 1985
"Other"	46339	Unknown	Unknown	Reportedly issued by NJDEP
"Other"	41104	Unknown	Unknown	Reportedly issued by NJDEP

12. Site Status

_ Active   X Inactive   _ Unknown

13. Years of Operation 1975 to 1981

14. Identify the types of waste sources (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Sources

Waste Unit No.	Waste Source Type	Facility Name for Unit
1	Containers	Drums
2	Scrap Metal or Junk Pile	Pier

(b) Other Areas of Concern

Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.

All areas of concern are discussed in Part II, Waste Source Information.

Ref. Nos. 1, 2, 6, 27, 29, 32, 33

15. Information available from

Contact Sandy Foose   Agency U.S. EPA   Tel. No. (908) 906-6808

Preparer Claire Baruxis   Agency HALLIBURTON NUS Environmental Corporation

Date March 30, 1992

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following items.

Waste Unit 1 - Containers (Drums)

Source Type

_	**Landfill**	_	**Land Treatment**
_	**Surface Impoundment**	_	**Chemical Waste Pile**
X	**Drums**	_	**Scrap Metal or Junk Pile**
_	**Tanks/Containers**	_	**Tailings Pile**
_	**Contaminated Soil**	_	**Trash Pile**
_	**Pile**	_	**Other**

Description:

Waste material was reportedly stored in drums on concrete, indoors and outdoors. The facility's RCRA Part A submittal indicated drum storage near the western part of the site and also to the north, near the Arthur Kill. During the HALLIBURTON NUS on-site reconnaissance on March 4, 1992, the owner indicated that on-site drum storage was along the western boundary of the property, to the south of the garage. During the reconnaissance, drum imprints were noted in blacktop paving, along the south property boundary, next to the Arthur Kill; a storm sewer grating is located next to the drum imprints. According to the Hazardous Waste Permit Application that was filed by the facility owner, corrosive material and emission control dust/sludge from secondary lead smelting were generated as wastes at the facility. "D000" waste was also reported. (It is not known what the owner intended by the use of the designation "D000".) Releases of unknown hazardous materials may have occurred during the 1981 on-site fire.

Hazardous Waste Quantity

The owner reported 20,000 pounds of emission control dust/secondary lead smelting sludge, 10,000 pounds of corrosive waste, and 20,000 pounds of "D000" waste as an estimated annual quantity of waste stored in drums.

Hazardous Substances/Physical State

Metallic constituents would be present in the emission control dusts. Chromium, lead, and cadmium may have been constituents of the secondary lead smelting sludge. Corrosive material that reportedly included ammonium chloride may have been present as solidified material or sludge.

SWMU - Specific Conclusion

It is possible that waste materials may have been deposited on the ground surface and migrated to the Arthur Kill; additional information, such as surface water and/or sediment sample data, is needed before a determination can be made regarding any possible release of hazardous substances from this unit.

Ref. Nos. 2; 8, pp. 4, 5, 7, 11; 9; 29; 30

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following items.

Waste Unit 2 - Pier

Source Type

_	Landfill	_	Land Treatment
_	Surface Impoundment	_	Chemical Waste Pile
_	Drums	X	Scrap Metal or Junk Pile
_	Tanks/Containers	_	Tailings Pile
_	Contaminated Soil	_	Trash Pile
_	Pile	_	Other

Description:

The former manufacturing plant at the E L Beth facility was located on pilings (referred to herein as a pier) in the Arthur Kill. The pier location is designated as lot 4.18, in Block 238; this lot is approximately 0.41 acre in size. The manufacturing plant and pier were destroyed in a fire that originated in one of the facility's kilns in May 1981. Much rubble is now present at the pier. A few burned or rusted drums were noted among the rubble during the HALLIBURTON NUS on-site reconnaissance that was conducted on March 4, 1992. It appears that contaminants that may be associated with debris on the pier could migrate to the Arthur Kill as a result of surface water runoff, air migration, or possible collapse of the badly damaged structure.

Hazardous Waste Quantity

The quantity of waste that may currently be (or may have once been) present in debris at the pier is not known.

Hazardous Substances/Physical State

Hazardous substances that may be present include lead, chromium, and cadmium, which were once generated as wastes on site, and unknown substances that may have been generated during the 1981 fire. Such substances, if present, would be associated with particulate debris or other solids.

SWMU - Specific Conclusion

Based upon knowledge of wastes formerly generated at the facility, and the proximity of the plant and exposed debris to the Arthur Kill, it is possible that a release of contaminants such as lead, cadmium, or chromium, or of unknown fire-generated materials, may have occurred. Additional information, such as surface water and/or sediment sample data, is needed before a determination can be made regarding any possible release of hazardous substances from this unit.

Ref. Nos. 2; 4, p. 3; 8, pp. 4, 5; 27; 28; 29; 30

PART III. SAMPLING RESULTS

EXISTING ANALYTICAL DATA

No analytical data exist for the site.

PART IV. HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence.**

   It is not likely that site contaminants would reach the aquifer of concern. Paving that is present would favor overland contaminant migration to the Arthur Kill. Moreover, a confining unit of clay overlies the aquifer of concern.

   Ref. Nos. 8, pp. 4, 5; 10, pp. 15, 17, 18

2. **Describe the aquifer of concern; include information such as depth, thickness, geologic composition, areas of karst terrain, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.**

   The site is located within the northern part of the New Jersey Coastal Plain physiographic province. The aquifer of concern is the Farrington Sand member of the Raritan Formation, the upper surface of which occurs at a depth of approximately 90 feet below sea level in the area of the site. Geologic units that overlie the Farrington Sand near the site include the Wisconsin Drift terminal moraine, which mantles the area, and the Woodbridge Clay. The Wisconsin Drift has a thickness of approximately 50 feet near the site, and consists of a mixture of red clay, sand, and gravel, and a few boulders. It is reported that in most areas this material is fairly impermeable (Ref. No. 10, pp. 3, 12, 15; Ref. No. 11, pp. 9, 10, 11, 15, 16, 17, 18; Ref. No. 12, p. 3; Ref. No. 13). It is likely that shallow groundwater flow in this material is influenced by tidal water. The Woodbridge Clay, an extensive, impervious confining layer that is approximately 40 feet thick in the area of the site, lies between the drift material and the Farrington Sand. The Woodbridge Clay consists of micaceous silts and clays; its permeability is estimated to be 10^{-7} cm/sec or less (Ref. No. 10, pp. 15, 17, Ref. No. 11, p. 17; Ref. No. 12, p. 3; Ref. No. 18).

   In Middlesex County the Farrington Sand consists of coarse- to fine-grained sand with lignite and pyrite, and locally it contains clay beds. The permeability of the Farrington Sand is 10^{-3} to 10^{-5} cm/sec. Its thickness and depth increase to the southeast. From its outcrop north of the site, to areas south of the Raritan River, it thickens from a feather edge to approximately 130 feet, and has a reported dip to the southeast of 45 to 60 feet per mile (Ref. No. 10, pp. 3, 10, 11, 13, 15; Ref. No. 11, pp. 6, 18, 19; Ref. No. 12, p. 3; Ref. No. 13; Ref. No. 18;). The direction of groundwater flow in the Farrington Sand is to the south; however, the hydraulic connection across the Raritan River is restricted to some extent by discontinuities in the formation and the presence of relatively impermeable mud (Ref. No. 10, p. 10; Ref. No. 11, pp. 10, 18, 19; Ref. No. 12, p. 7).

3. **What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?**

   The lowest known point of waste storage is the paved surface on which drums were located; the estimated depth from this point of waste storage to the estimated potentiometric surface of the Farrington Sand Aquifer is approximately 50 to 60 feet.

   Ref. Nos. 8; 10, p. 19; 14

4. **Identify and determine the distance to and depth of the nearest well that is currently used for drinking purposes?**

Public water supply wells in the Borough of South Amboy are located between 2 and 3 miles south of the site and are separated from the site by the Raritan River. These wells draw from the Old Bridge Sand Aquifer at a depth of approximately 48 feet, and are currently reserved for emergency use only. Five of the Borough of Sayreville's public water supply wells, also located across the Raritan River and approximately 3.5 miles south of the site, are the nearest known wells that are currently used for drinking purposes. Two of the wells are screened at a depth of approximately 250 feet, and draw from the Farrington Sand Aquifer; three of the wells, screened at a depth of approximately 80 to 90 feet, draw from the Old Bridge Sand Aquifer. The Old Bridge Sand has not been identified in outcrop anywhere north of the Raritan River, and thus is not included in the description of the aquifer of concern. Hydraulic continuity across the Raritan River is restricted to some extent by aquifer discontinuities and relatively impermeable mud beneath the river bed.

Ref Nos. 10, p. 10; 14; 15; 16; 19

5. **If a release to groundwater is observed or suspected, determine the number of people that obtain drinking water from wells that are documented or suspected to be located within the contamination boundary of the release.**

It is not suspected that site contaminants would have reached the Farrington Sand, as the site is paved, and a confining geologic unit overlies the aquifer. Moreover, the distance to the nearest potable wells and hydraulic interference of the Raritan River further reduce the likelihood of contaminant migration to supplies obtained from the Farrington Sand Aquifer.

Ref. Nos. 8, pp. 4, 5; 10, pp. 17, 18; 11 through 13

6. **Identify the population served by wells that are not expected to be contaminated located within 4 miles of the site that draw from the aquifer of concern.**

Distance	Population
0 - ¼ mi	0
>¼ - ½ mi	0
>½ - 1 mi	0
>1 - 2 mi	0
>2 - 3 mi	8,500
>3 - 4 mi	12,000

State whether groundwater is blended with surface water, groundwater, or both before distribution.

The well field located at a distance of 3 to 4 miles from the site consists of two wells that draw from the aquifer of concern and three that draw from the more shallow Old Bridge Sand Aquifer. The water from the deep and shallow wells is mixed. Recharge water from the South River is also mixed with the well water.

Ref. No. 16

7. **Is there a wellhead protection area within 4 miles of the site?**
No; wellhead protection areas have not yet been delineated in the state of New Jersey, and there are no known wells used for potable purposes on Staten Island, New York, which is also located within 4 miles of the site.

Ref. Nos. 17, 19, 20

8. **Does a waste source overlie a designated or proposed wellhead protection area? If a release to groundwater is observed or suspected, does a designated or proposed wellhead protection area lie within the contaminant boundary of the release?**

Not applicable.

Ref. Nos. 17, 20

9. **Identify uses of groundwater within 4 miles of the site (i.e. private drinking source, municipal source, commercial, irrigation, unusable).**

Groundwater obtained within 4 miles of the site is used for industrial, commercial, and potable water supply purposes. The potable water wells are located across the Raritan River, a large water body.

Ref. No. 14, 15, 16

SURFACE WATER ROUTE

10. **Describe the likelihood of a release of contaminant(s) to surface water as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence.**

A release of contaminants to the Arthur Kill, located adjacent to the site, is suspected. Contaminants that may be associated with the wastes generated at the site include lead, chromium, and cadmium. Unknown contaminants may have also been generated or released during a 1981 on-site fire, which destroyed the facility. Much rubble remains at the fire-damaged pier, where the facility's manufacturing plant was located. A few rusted or burned drums were noted among the rubble during the HALLIBURTON NUS on-site reconnaissance that was conducted on March 4, 1992.

Ref. Nos. 2; 8, p. 4; 28; 29; 30

11. **Identify the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.**

The Arthur Kill adjoins the land portion of the site and is located beneath the pier on which the manufacturing plant was located. The site is very level, but surface drainage would be expected to flow to the Arthur Kill as a result of flow over the paved surface and discharge through the storm sewer that is present. During the HALLIBURTON NUS on-site reconnaissance that was conducted on March 4, 1992, drum imprints were noted in an area of blocktop paving located next to the Arthur Kill; a storm sewer grating is also located next to the drum imprints. Drainage also flows through the pier, where much rubble is present, directly to the Arthur Kill.

Ref. Nos. 2; 8, pp. 4, 7, 11; 28

12. **What is the distance in feet to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.**

The Arthur Kill adjoins the land portion of the site and is located beneath the pier on which the manufacturing plant was located.

Ref. Nos. 2; 8, p. 4; 28

13. **Determine the type of floodplain that the site is located within.**

The site is primarily located within the 100-year flood boundary; a portion of the property is located within the 100-year to 500-year flood boundaries.

Ref. No. 22

14. **Identify drinking water intakes in surface waters within 15 miles downstream of the point of surface water entry. For each intake identify: the name of the surface water body in which the intake is located, the distance in miles from the point of surface water entry, population served, and stream flow at the intake location.**

Intake	Distance	Population Served	Flow (cfs)

There are no drinking water intakes along surface water within 15 miles downstream of the site.

Ref. Nos. 16, 21, 23

15. **Identify fisheries that exist within 15 miles downstream of the point of surface water entry. For each fishery specify the following information:**

Fishery Name	Water Body Type	Flow (cfs)	Saline/Fresh/Brackish
Arthur Kill	Coastal Tidal Water	Not Applicable	Saline
Raritan Bay	Coastal Tidal Water	Not Applicable	Saline
Raritan River	Coastal Tidal Water	Not Applicable	Brackish
Lower NY Bay	Coastal Tidal Water	Not Applicable	Saline
Sandy Hook Bay	Coastal Tidal Water	Not Applicable	Saline

Ref. Nos. 23, 25, 26

16. **Identify surface water sensitive environments that exist within 15 miles of the point of surface water entry. For each sensitive environment specify the following:**

Sensitive Environment	Water Body Type	Flow (cfs)	Wetland Frontage (miles)
Federally-listed endangered bird species (Arthur Kill, Raritan River)	Coastal Tidal Water	Not Applicable	
State-listed endangered fish species (Arthur Kill, Raritan River, Low New York Bay, Sandy Hook Bay)	Coastal Tidal Water	Not Applicable	
State-listed threatened or endangered breeding bird population. (Sandy Hook Bay)	Coastal Tidal Water	Not Applicable	
Wetland	Coastal Tidal Water	Not Applicable	6.3
Wetland (Federally Protected; Raritan River)	Coastal Tidal Water	Not Applicable	

Ref. Nos. 23, 24

17. **If a release to surface water is observed or suspected, identify any intakes, fisheries, and sensitive environments from question Nos. 12-14 that are or may be located within the contamination boundary of the release.**

Intake: Not Applicable

Fishery: Arthur Kill

Sensitive Environment:
- Federally-listed endangered bird species at Arthur Kill
- State-listed endangered fish species at Arthur Kill

Ref. Nos. 23 through 26

SOIL EXPOSURE PATHWAY

18. **Determine the number of people that occupy residences or attend school or day care on or within 200 feet of the site property.**

There are no residences, schools, or day care facilities on or within 200 feet of the site property.

Ref. No. 8, pp. 14, 15

19. **Determine the number of people that regularly work on or within 200 feet of the site property.**

It is estimated that no more than 100 people may work within 200 feet of the site property; a large warehouse is located within 200 feet of the site, and work is ongoing outdoors, next to the site.

Ref. No. 8

20. **Identify terrestrial sensitive environments on or within 200 feet of the site property.**

There are no known terrestrial sensitive environments on or within 200 feet of the site property.

Ref. Nos. 8, 23

AIR ROUTE

21. **Describe the likelihood of release of contaminants to air as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release define the supporting analytical evidence.**

It is suspected that a potential exists for release to air of particulates and other contaminants that may be present in debris at the fire-damaged factory. Unknown contaminants may have been generated during the on-site fire that occurred in 1981. Contaminants that may be associated with the wastes formerly generated include lead, chromium, and cadmium. During the HALLIBURTON NUS on-site reconnaissance that was conducted on March 4, 1992, ambient readings that were obtained during continuous air monitoring with an OVA and HNu did not significantly exceed background. Locations of above background readings include the following: at an opening in the concrete at the interface of the land-based portion of the site and the pier; from an open container labeled "roofing tar with asbestos" (apparently not associated with former site operations); and at an open container labeled "another pentanone product", approximately 1 gallon in size.

Ref. No. 8, pp. 4, 9, 12, 13

22. Determine populations that reside within 4 miles of the site.

Distance	Population
0 - ¼ mi	279
>¼ - ½ mi	4,567
>½ - 1 mi	19,400
>1 - 2 mi	19,821
>2 - 3 mi	25,530
>3 - 4 mi	43,847

Ref. No. 31

23. Identify sensitive environments, including wetlands and associated wetlands acreage, within ½ mile of site.

0 - ¼ mile
Sensitive Environments/Wetland Acreage

- Possible presence of federally-listed endangered bird species and state-listed endangered fish species.

¼ - ½ mile
Sensitive Environments/Wetland Acreage

- Possible presence of federally-listed endangered bird species and state-listed endangered fish species.
- Approximately 2.3 acres of wetland

Ref. Nos. 23, 24

24. If a release to air is observed or suspected, determine the number of people that reside or are suspected to reside within the area of air contamination from the release.

Approximately 280 people live within 0.25 mile of the site.

Ref. No. 31

25. If a release to air is observed or suspected, identify any sensitive environments, listed in question No. 23, that are or may be located within the area of air contamination from the release.

The potential exists for the presence of a federally-listed endangered bird species and a state-listed endangered fish species within 0.5 mile of the site, and approximately 2.3 acres of wetland are present within 0.5 mile of the site. The potential distance of the migration of particulates that might remain from site operations is not known.

Ref. Nos. 8; 23; 24

ATTACHMENT 1

EXHIBIT A

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

ON-SITE RECONNAISSANCE: MARCH 4, 1992

PHOTOGRAPH INDEX

E L BETH LTD
PERTH AMBOY, NEW JERSEY
MARCH 4, 1992

ALL PHOTOGRAPHS TAKEN BY CLAIRE BARUXIS

PHOTO NUMBER	DESCRIPTION	TIME
1P-1, 1P-3	Photograph taken from the southeastern corner of the land portion of the site, facing west to northeast.	1045
1P-4, 1P-5	Photograph taken from the southeastern corner of the land portion of the site facing north.	1045
1P-6, 1P-7, 1P-8	View of the fire damaged factory and pier along the Arthur Kill, at the E L Beth site.	1048
1P-9	Closer view of the fire-damaged pier.	1050
1P-10	Closer view of another part of the fire-damaged pier, taken from the land portion of the site.	1051
1P-11	Photograph of the location of OVA reading, at the interface of the pier and the land portion of the site.	1055
1P-12	Photograph of a storm sewer grating, blacktop area with drum imprints, and broken fencing, taken facing the southeastern corner of the land portion of the site.	1058
1P-13	Photograph of the on-site conduit that contains soil and debris, and the adjacent property along the northern border of the E L Beth site, taken facing northeast.	1105
1P-15	Photograph of debris and the former garage at the site, taken facing west.	1112
1P-16	Photograph facing southeast, of the blacktop paving along the southern border of the site. A CERCLIS site borders the E L Beth property to the south.	1115
1P-17	Photograph of debris and the former drum staging ramp at the site, taken facing west.	1117
1P-18	A former on-site drum storage location along the western border of the property, next to the garage.	1119
1P-19	Photograph of debris and an overturned can at the former drum staging ramp. The label on the can describes the contents as "roofing tar with asbestos", and "check-a-leak plastic roof cement". An OVA reading and an HNu reading were obtained at the overturned can.	1120

E L BETH LTD
PERTH AMBOY, NEW JERSEY
MARCH 4, 1992

ALL PHOTOGRAPHS TAKEN BY CLAIRE BARUXIS

PHOTO NUMBER	DESCRIPTION	TIME
1P-22	Photograph of the entrance to the properties at 500 High Street, taken from the street.	1150

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-1, 1P-3 March 4, 1992 1045

Photograph taken from the southeastern corner of the land portion of the site, facing west to northeast.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-4, 1P-5 March 4, 1992 1045

Photograph taken from the southeastern corner of the land portion of the site facing north.

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-6, 1P-7, 1P-8 March 4, 1992 1048
View of the fire damaged factory and pier along the Arthur Kill, at the E L Beth site.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-9 March 4, 1992 1050
Closer view of the fire-damaged pier.

1P-10 March 4, 1992 1051
Closer view of another part of the fire-damaged pier, taken from the land portion of the site.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-11 March 4, 1992 1055
Photograph of the location OVA reading, at the interface of the pier and the land portion of the site.

1P-12 March 4, 1992 1058
Photograph of a storm sewer grating, blacktop area with drum imprints, and broken fencing, taken facing the southeastern corner of the land portion of the site.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-13 March 4, 1992 1105
Photograph of the on-site conduit that contains soil and debris, and the adjacent property along the northern border of the E L Beth site, taken facing northeast.

1P-15 March 4, 1992 1112
Photograph of debris and the former garage at the site, taken facing west.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-16 March 4, 1992 1115
Photograph facing southeast, of the blacktop paving along the southern border of the site. A CERCLIS site borders the E L Beth property to the south.

1P-17 March 4, 1992 1117
Photograph of debris and the former drum staging ramp at the site, taken facing west.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-18 March 4, 1992 1119
A former on-site drum storage location along the western border of the property, next to the garage.

1P-19 March 4, 1992 1120
Photographs of debris and an overturned can at the former drum staging ramp. The label on the can describes the contents as "roofing rar with asbestos:, and "check-a-leak plastic roof cement". An OVA reading and an HNu reading were obtained at the overturned can.

PHOTOGRAPH LOG

E L BETH LTD
PERTH AMBOY, NEW JERSEY

1P-22 March 4, 1992 1150

Photograph of the entrance to the properties at 500 High Street, taken from the street.

ATTACHMENT 2

REFERENCES

1. Acknowledgement of Notification of Hazardous Waste Activity (Verification). E L Beth. October 9, 1980.

2. U.S. EPA General Information Form 3510-1 Consolidated Permits Program, postmarked December 13,1980, and Hazardous Waste Permit Application 3510-3, dated November 18, 1980. E L Beth Ltd.

3. Letter from Robert M. Silverman, E.L. Beth Limited, to Frank Coolick, NJDEP Bureau of Hazardous Waste Engineering. March 14, 1983.

4. NJDEP Generator and TSD facility Inspection Form. E.L. Beth Ltd., EPA ID No. NJD067484923. January 16, 1985.

5. Memorandum from Linda Zaninelli to file through Fred Sickels (both of NJDEP), Subject: Phone Conversations. January 17, 1985.

6. Letter from Frank Coolick, NJDEP, Bureau of Hazardous Waste Engineering, to Robert Silverman, E.L. Beth. February 14, 1985.

7. NJDEP Hazardous Waste Management Facility Inspection Report. E.L. Beth Ltd., EPA ID No. NJD067484923. June 4, 1990.

8. Field Notebook Number HNUS005, E L Beth Ltd Site, NOMAD No. J030, On-site Reconnaissance, HALLIBURTON NUS Environmental Corporation, Iselin, N.J., March 4, 1992.

9. Project Note: Waste Quantity Reported for the E L Beth Site. By Claire Baruxis, HALLIBURTON NUS Environmental Corporation, March 27, 1992.

10. Geohydrology and Digital-Simulation Model of the Farrington Aquifer in the Northern Coastal Plain of New Jersey. U.S. Geological Survey Water-Resources Investigations 79-106, August 1979.

11. Barksdale, H.C. et al. The Ground-Water Supplies of Middlesex County, New Jersey. Special Report 8. State of New Jersey Water Policy Commission in cooperation with the U.S. Department of the Interior, Geological Survey, 1943.

12. Middlesex County 208 Area-Wide Waste Treatment Management Planning, Task 8 - Ground-Water Analysis. Geraghty and Miller, Inc., November 1976.

13. Geological Investigations of the Coastal Plain of Southern New Jersey. Part 2: A. Hydrogeology and the Coastal Plain. Edited by Claude M. Epstein. 2nd Annual Meeting of the Geological Association of New Jersey, sponsored by Geology Program, Stockton State College, Pomona, New Jersey.

14. NJDEP, Division of Water Resources, Well Record, Permit No. 26-7714, Stolt Terminals Inc., August 20, 1985.

15. U.S. Geological Survey Groundwater Site Inventory of wells in Middlesex County. U.S.G.S., Trenton, New Jersey, January 9, 1989.

16. Project Note: Potable water supply wells located within 4 miles of the E L Beth Site. By Claire Baruxis, HALLIBURTON NUS Environmental Corporation, March 26, 1992.

REFERENCES (CONTD)

17. Telecon Note: Conversation between Dan Van Abs, NJDEPE, and Kathy Campbell, HALLIBURTON NUS Environmental Corporation, February 14, 1992.

18. Hazard Ranking System; Final Rule, 40 CFR, Part 300, Federal Register, Vol. 55, No. 241, p. 51601, December 14, 1990.

19. Four Mile Vicinity Map based on U.S. Department of the Interior Geological Survey Topographic Maps, 7.5 minute series, "Perth Amboy Quadrangle, N.J.-N.Y.", 1956, photorevised 1981; "Aurthur Kill Quadrangle, N.Y.-N.J.", 1966, photorevised 1981; "Keyport Quadrangle, N.J.-N.Y.", 1954, photorevised 1970; "South Amboy Quadrangle, N.J.-N.Y.", 1954, photorevised 1981.

20. Geologic and Geohydrologic Reconnaissance of Staten Island, New York. U.S. Geological Survey Water-Resources Investigations Report 87-4048. 1988.

21. Surface Water Quality Standards, New Jersey Administrative Code 7:9-4.1 et seq., NJDEP, Division of Water Resources, August 1989.

22. Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Rate Map, City of Perth Amboy, Middlesex County, New Jersey, Community Panel Number 340272 0001 C, May 1, 1984.

23. Fifteen Mile Surface Water Route Map, E.L. Beth Site. Based on U.S. Department of the Interior Fish and Wildlife Service National Wetlands Inventory Maps: "Perth Amboy, N.J.-N.Y.", 1976; South Amboy, N.J.-N.Y.-N.J.", 1976; "Authur Kill, N.Y.-N.Y., 1976; Keyport, N.J.-N.Y.", 1976; The Narrows, N.Y.", "Sandy Hook, N.J.-N.Y.". 1976

24. Project Note: Sensitive environments located along the 15-mile surface water route downstream of the E L Beth Site, Perth Amboy, New Jersey. By Claire Baruxis, March 24, 1992.

25. Telecon Note: Conversation between Mr. Robert Soldwedel, NJDEPE, and Claire Baruxis, HALLIBURTON NUS Environmental Corporation, November 18, 1991.

26. News Paper Article, "State circulates warnings on consuming certain fish", <u>The Record</u>, February 9, 1992.

27. Project Note: Lot and block number, and property acreage, E L Beth Site, Perth Amboy, New Jersey. By Claire Baruxis, March 27, 1992.

28. Telecon Notes:

    - Conversation between Perth Amboy Fire Department representatives, and Claire Baruxis, HALLIBURTON NUS Environmental Corporation, March 24,1992.

    - Conversation between Investigator Ritz, Middlesex County Prosecutor's Office, and Claire Baruxis, HALLIBURTON NUS Environmental Corporation, March 25, 1992.

29. Telecon Note: Conversation between Carol Surgens, Jones and Day, and Claire Baruxis, HALLIBURTON NUS Environmental Corporation, February 24, 1992.

30. 40 CFR, Part 261. Revised as of July 1, 1988.

REFERENCES (CONTD)

31. General Sciences Corporation, Graphical Exposure Modeling Systems (GEMS), Landover, Maryland, 1986.

32. U.S. EPA Superfund Program, Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). Site/Event Listing, pp. 63, 65, and Site Alias Location Listing, pp. 80, 82. March 2, 1992.

33. Election Division, New Jersey Department of State, CN304, Trenton, N.J. Congressional Districts, January 1987.

REFERENCE NO. 1

EPA

ACKNOWLEDGEMENT OF NOTIFICATION OF HAZARDOUS WASTE ACTIVITY
(VERIFICATION)

This is to acknowledge that you have filed a Notification of Hazardous Waste Activity for the installation located at the address shown in the box below to comply with Section 3010 of the Resource Conservation and Recovery Act *(RCRA)*. Your EPA Identification Number for that installation appears in the box below. The EPA Identification Number must be included on all shipping manifests for transporting hazardous wastes; on all Annual Reports that generators of hazardous waste, and owners and operators of hazardous waste treatment, storage and disposal facilities must file with EPA; on all applications for a Federal Hazardous Waste Permit; and other hazardous waste management reports and documents required under Subtitle C of RCRA.

EPA I.D. NUMBER → NJD067484923

E L BETH
500 HIGH ST
PERTH AMBOY NJ 08861

INSTALLATION ADDRESS → 500 HIGH ST
PERTH AMBOY NJ 08861

EPA Form 8700-12B (4-80)

10/09/80

REFERENCE NO. 2

Please print or type in the unshaded areas only (fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-R0175

FORM 1 GENERAL — EPA — ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

F | N J D 0 6 7 4 8 4 9 2 3 | 3 D

LABEL ITEMS

I. EPA I.D. NUMBER

III. FACILITY NAME

V. FACILITY MAILING ADDRESS

VI. FACILITY LOCATION

PLEASE PLACE LABEL IN THIS SPACE

late post

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information ... If any of ... to the ... mation ... the ... is ... ate ... ich ... all ... to ... rip- ... der

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.

SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	YES	NO	FORM ATTACHED
A. ... which results in a discharge to waters of the U.S.? (FORM 2A)		X		B. ... include a concentrated animal feeding operation or aquatic animal production facility which results in a discharge to waters of the U.S.? (FORM 2B)		X	
C. Is this a facility which currently results in discharges to waters of the U.S. other than those described in A or B above? (FORM 2C)		X		D. Is this a proposed facility (other than those described in A or B above) which will result in a discharge to waters of the U.S.? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of hazardous wastes? (FORM 3)	X			F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed stationary source which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X		J. Is this facility a proposed stationary source which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	

III. NAME OF FACILITY

1 SKIP E L BETH LTD

IV. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)		
MCCABE THOMAS A PROJECT ENG'R	201	826	0800

V. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

3 500 HIGH STREET

B. CITY OR TOWN	C. STATE	D. ZIP CODE
PERTH AMBOY	NJ	08861

AGENCY YORK, N.Y.

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

500 HIGH STREET

B. COUNTY NAME

MIDDLESEX

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
6 PERTH AMBOY	NJ	08861	

II. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
3341	(specify) SECONDARY SMELTING & REFINING NON FERROUS	7	(specify)
	(specify)		(specify)

III. OPERATOR INFORMATION

A. NAME

E L BETH LTD

B. Is the name listed in Item VIII-A also the owner?

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

M = PUBLIC (other than federal or state)

P (specify)

A. PHONE (area code & no.) 201 826 0800

E. STREET OR P.O. BOX

500 HIGH STREET

F. CITY OR TOWN: PERTH AMBOY | G. STATE: NJ | H. ZIP CODE: 08861

IX. INDIAN LAND

Is the facility located on Indian lands?

☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

9		Emissions from Proposed Sources	
9 U		E. OTHER (specify) 46339	(specify) N.J. DEP.
C. RCRA (Hazardous Wastes) 9 R		E. OTHER (specify) 41194	(specify) N.J. DEP.

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)

TIN & LEAD SCRAP ARE MELTED AND ALLOYED AND CAST INTO INGOTS.

ELECTRONIC SCRAP IS PROCESSED TO RECOVER GOLD CONTENT.

F9: A/51

DEC 3 1980 ... NEW YORK, N.Y. 10007

XIII. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
RICHARD STEINBERG PRESIDENT		

COMMENTS FOR OFFICIAL USE ONLY

C

EPA Form 3510-1 (6-80) REVERSE

Please print or type in the unshaded areas only (fill-in areas are spaced for elite type, i.e., 12 characters/inch).

Form Approved OMB No. 158-S80004

FORM 3 RCRA

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS WASTE PERMIT APPLICATION

Consolidated Permits Program

(This information is required under Section 3005 of RCRA.)

I. EPA I.D. NUMBER

F NJD006748923 [illegible]

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (yr., mo., & day)	COMMENTS
[illegible]	[illegible]	[illegible]

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA I.D. Number, or if this is a revised application, enter your facility's EPA I.D. Number in Item I above. [illegible]

A. FIRST APPLICATION (place an "X" below and provide the appropriate date)

[X] 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)

[ ] 2. NEW FACILITY (Complete item below.)

C	YR.	MO.	DAY
8	75	10	30

FOR EXISTING FACILITIES, PROVIDE THE DATE (yr., mo., & day) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

YR.	MO.	DAY

FOR NEW FACILITIES, PROVIDE THE DATE (yr., mo., & day) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION (place an "X" below and complete Item I above)

[ ] 1. FACILITY HAS INTERIM STATUS [illegible]

[ ] 2. FACILITY [illegible]

III. PROCESSES – CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes [illegible] at the facility [illegible] entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be [illegible] not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the form (Item III-C). [illegible]

B. PROCESS DESIGN CAPACITY [illegible]

1. AMOUNT — Enter the amount. [illegible]
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D79	GALLONS OR LITERS
LANDFILL	D80	ACRE-FEET (the volume that would cover one acre to a depth of one foot) OR HECTARE-METER
LAND APPLICATION	D81	ACRES OR HECTARES
OCEAN DISPOSAL	D82	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D83	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	[illegible]	[illegible]
SURFACE IMPOUNDMENT	T02	GALLONS [illegible]
INCINERATOR	[illegible]	[illegible] METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS [illegible]
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Item III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE	UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G	[illegible]	[illegible]	[illegible]	[illegible]
LITERS	L	TONS PER HOUR	D	HECTARE-METER	F
CUBIC YARDS	Y	METRIC TONS PER HOUR	W	ACRES	B
CUBIC METERS	C	GALLONS PER HOUR	E	HECTARES	Q
GALLONS PER DAY	U	LITERS PER HOUR	H		

EXAMPLE FOR COMPLETING ITEM III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour. [illegible]

C DUP [illegible]

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE	FOR OFFICIAL USE ONLY
X-1	S02	600	G	
X-2	T03	[illegible]	[illegible]	
1	S01	2500000	G	
2	~~S01~~	~~[illegible]~~	[illegible]	

Continued from the front.

III. PROCESSES *(continued)*

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESSES *(code "T04")*. FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

DEC 3 11 58 AM '80
ENVIR... AGENCY ...TION
NEW YORK, N.Y. 10007

IV. DESCRIPTION OF HAZARDOUS WASTES

A. **EPA HAZARDOUS WASTE NUMBER** — Enter the four–digit number from 40 CFR, Subpart D for each listed hazardous waste you will handle. If you handle hazardous wastes which are not listed in 40 CFR, Subpart D, enter the four–digit number*(s)* from 40 CFR, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.

B. **ESTIMATED ANNUAL QUANTITY** — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. **UNIT OF MEASURE** — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	[illegible]
TONS	[illegible]	METRIC TONS	[illegible]

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. PROCESS CODES:
   For listed hazardous waste: For each listed hazardous waste entered in column A select the code*(s)* from the list of process codes contained in Item III to indicate how the waste will be stored, treated, and/or disposed of at the facility.
   For non–listed hazardous wastes: For each characteristic or toxic contaminant entered in column A, select the code(s) from the list of process codes contained in Item III to indicate all the processes that will be used to store, treat, and/or dispose of all [illegible]
   Note: Four spaces are provided for entering process codes. If more are needed: [illegible] extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code*(s)*.

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER — Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to [illegible]
2. In column A of the next line enter the other EPA Hazardous Waste Number [illegible] "included with above" and make no other entries on that line.
3. Repeat step 2 for each other EPA Hazardous Waste Number [illegible]

EXAMPLE FOR COMPLETING ITEM IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* [illegible] per year of chrome shavings from leather tanning and finishing operation [illegible] are corrosive only and there will be an estimated 200 pounds per year of [illegible] 100 pounds per year of that waste. Treatment will be in an incinerator and [illegible]

LINE NO.	A. EPA HAZARD. WASTE NO *(enter code)*				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES
X-1	[illegible]	[illegible]	[illegible]	[illegible]	900	[illegible]	[illegible]
X-2	D	0	0	2	400	P	T 0 [illegible]
X-3	[illegible]	[illegible]	0	1	100	P	[illegible]
X-4	D	0	0	2			Included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

Form Approved OMB No. 158-S80004

EPA I.D. NUMBER (enter from page 1)	FOR OFFICIAL USE ONLY		
W NJ0067484923	W	DUP	2	D

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. 1. PROCESS CODES (enter)				D. 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	K069	20,000000	P	S01				
2	D002	10,000000	P	S01				
3	D000	20,000000	P	S01				
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

EPA Form 3510-3 (6-80)

CONTINUE ON REVERSE

Continued from the front.

IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 3.

NEW YORK, N.Y. 10007

EPA I.D. NO. (enter from page 1)
F NJD067484923 3 6

F6: A/55   F6: A/56

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail).*

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail).*

VII. FACILITY GEOGRAPHIC LOCATION

LATITUDE (degrees, minutes, & seconds)	LONGITUDE (degrees, minutes, & seconds)
40 30 460	074 15 340

VIII. FACILITY OWNER

☐ A. If the facility owner is also the facility operator as listed in Section VIII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VIII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. (area code & no.)
E M.C. CANFIELD SONS	201-688-5050

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE
F 1000 BRIGHTON	G UNION	NJ	

IX. OWNER CERTIFICATION

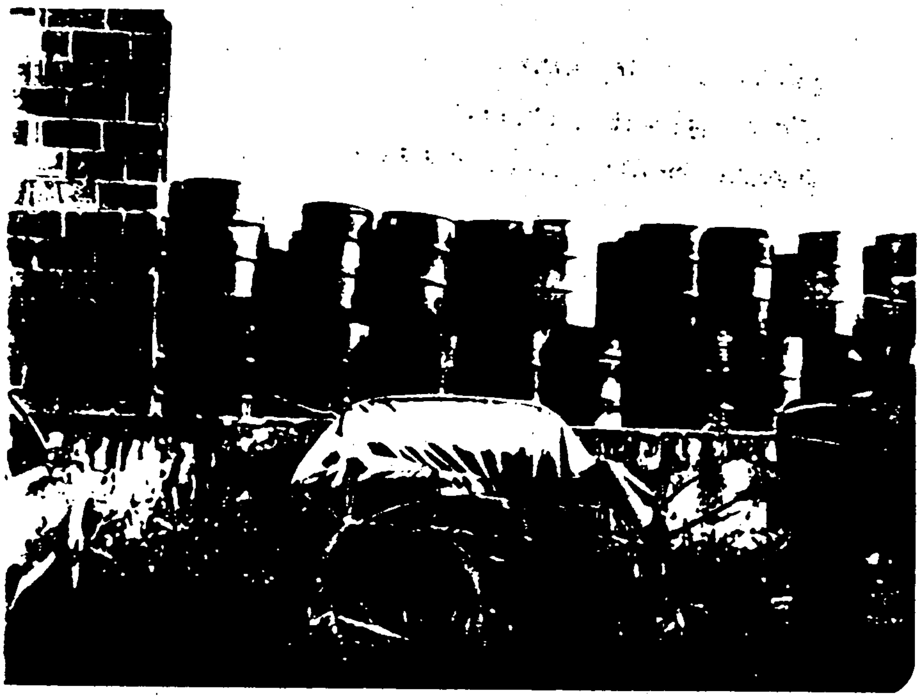
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME (print or type)	B. SIGNATURE	C. DATE SIGNED
ROBERT M. SILVERMAN		11/18/80

X. OPERATOR CERTIFICATION

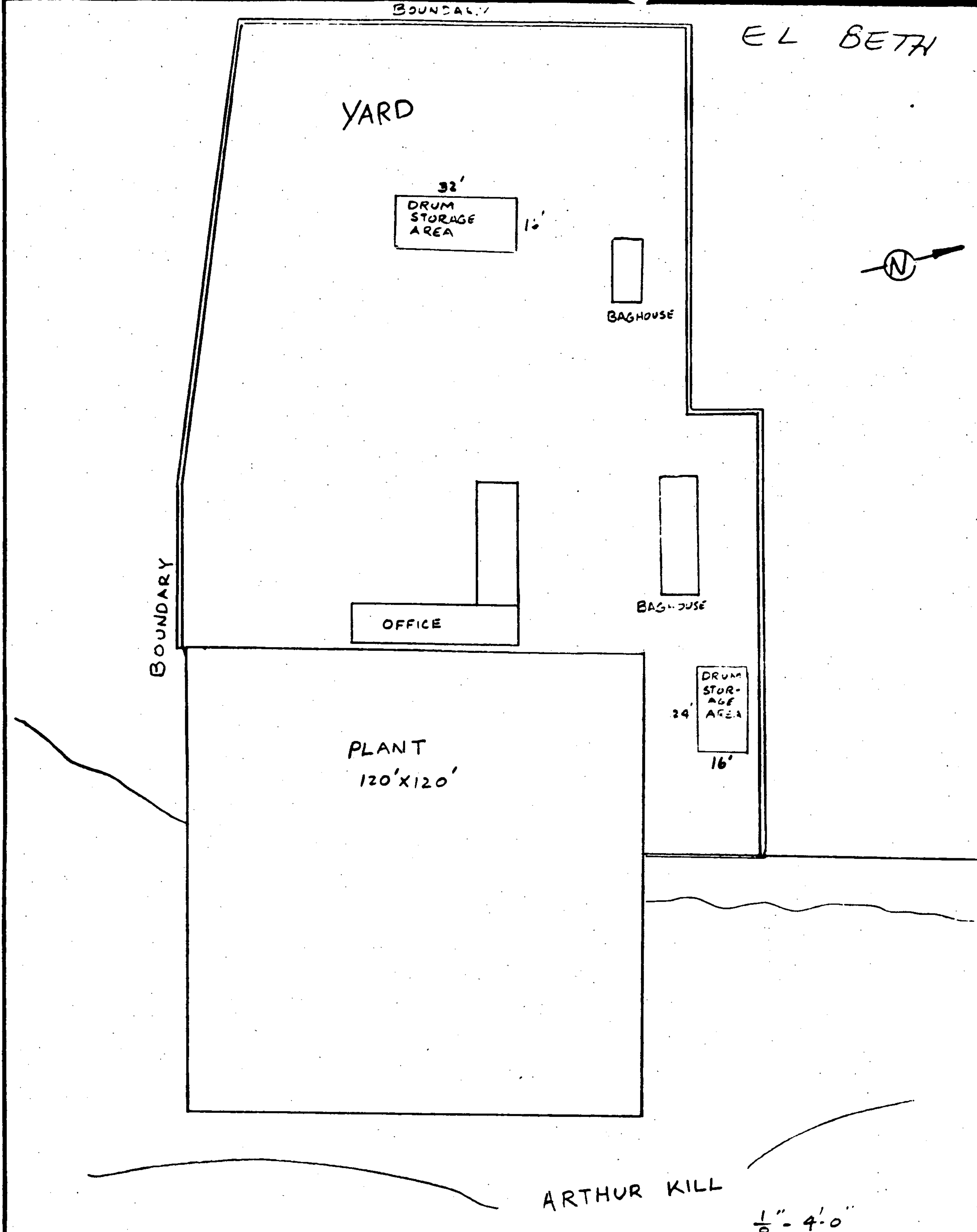
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME (print or type)	B. SIGNATURE	C. DATE SIGNED
RICHARD STEINBERG		11/18/80



Continued from page 4. NJD067484425

V. FACILITY DRAWING *(see page 4)*



REFERENCE NO. 3

Received 1-11-85
From: R. Silverman

E. L. BETH LIMITED

P.O. `x 1769
Union, NJ 07083
201-688-9011

~~500 HIGH STREET~~
~~PERTH AMBOY, NJ 08861~~
~~(201) 826-0800~~
CABLE ADDRESS: BETHMETAL, PERTH AMBOY
TELEX No. 844535

March 14, 1983

Mr. Frank Coolick, Chief
Bureau of Hazardous Waste
Engineering
32 E. Hanover Street
Trenton, NJ 08625

SUBJECT: Annual Report

REF: NJD067484923
500 High Street, Perth Amboy, NJ 08861

Dear Mr. Coolick:

Please delist the above facility.

This plant has been closed since May 1981. There has been no activity since then and there is no storage of hazardous waste at this location.

Sincerely,

E. L. BETH LIMITED

Robert M. Silverman
Vice President

RMS/fh

REFERENCE NO. 4

10-03 --

NJDEP INSPECTION FORM

Report Prepared for:

Generator [X]

Transporter [ ]

HWM (TSD) facility [X]

see comments

Facility Information

Name: E.L. Beth Ltd

Address: 500 High Street
Perth Amboy, N.J. 08861

Lot: ______ Block: ______

County: Middlesex

Phone: 201-688-5050 (Silverman's Office)

EPA ID#: NJD067484923

Date of Inspection: 1-16-85

Participating Personnel

State or EPA personnel: L. Zaninelli - NJ.D.E.P.

Facility personnel: Robert Silverman - Vice President
Robert McIntyre - Plant Manager of Edison site

Report Prepared by Name: L. Zaninelli

Region: Central

Telephone #: 609-292-5560

Reviewed by: [signature]

Date of Review: 1/17/85

FACILITY NAME: E.L. Beth Ltd.
ADDRESS: 500 High St.
Perth Amboy, N.J. - 08861
COUNTY: Middlesex
EPA ID #: NJD067484923
DATE OF INSPECTION: 1-16-85

TIME IN: 0930hars
TIME OUT: 0955hars

PHOTOS TAKEN ☒ YES ☐ NO

If yes, how many? 5

SAMPLES TAKEN ☐ YES ☒ NO NUMBER OF SAMPLES ________

NJDEP ID # ________________

MANIFESTS REVIEWED ☐ YES ☒ NO

Number of manifests in compliance ____________

Number of manifests not in compliance __________

List manifest document numbers of those manifests not in compliance.

Summary of Findings

Facility Description and Operations

E.L. Beth Ltd. has not been in operation since 5/81. According to Mr Robert Silverman, Vice President, a fire occurred on 5/15/81 collapsing the building, and destroying the site. At that time, they were just starting up operations at another E.L. Beth Ltd. site located at 331 Meadow Road in Edison which is registered with the State as a generator and TSD with an EPA ID# NJD980594022. All salvagable items from the Perth Amboy site were taken to the Edison site.

The E.L. Beth site located in Perth Amboy was purchased by Mr. Silverman in 1978. According to same, the only waste generated was baghouse dust from processes, and TSD status pertained to ≥90 day drum storage. I questioned him as to any waste stored on-site at the time of the fire, and its' disposition. He stated that he was unsure if any waste (baghouse dust) was on-site at

Summary of Findings

Facility Description and Operations

that time per se, but if there was, it would have been taken to the Edison site. I informed him that if any waste had been taken to the Edison site, he would be in violation of N.J.A.C. 7:26-7.5(c)1 - transporting waste without being permitted to do so. He also indicated that DEP-DHM representative Edwin Liew of the Hazardous Site Mitigation Administration, had been on-site on various occasions and site approval was given in regard to cleaning up the area after the fire. It must be noted that the site is located adjacent to the Dune Marine site, which is located due south of the EL Beth Ltd property. I questioned Mr. Silverman on any manifests generated by EL Beth, and he indicated that the trailer which housed all of this information was destroyed by the fire. I was also informed that the State was informed of closure and request to delist as a generator and TSD facility. (see attached letter sent to DHM Engineering

Summary of Findings

Facility Description and Operations

representative, Frank Coolick dated 3/14/83). A tour of the site was then conducted. (see attached map)

The entire site is situated on concrete. Located on the north side of the property near the fence is what appears to be some remaining process equipment (dust collector), and to the south of the main entrance, the remains of a shed (painted brick) and a sloping concrete platform. Due East located by the Arthur Kill River, is a smoke-stack, and the remains of a process building (structure) with some cardboard refuse (boxes) rubble observed. No apparent waste could be observed, and the site basically looked barren.

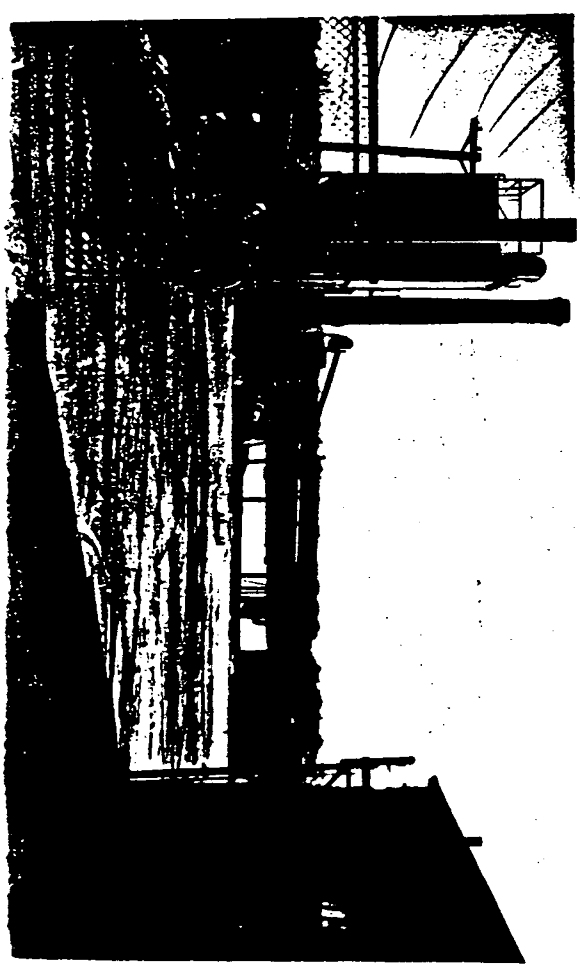
While operating, E.L. Roth Ltd. conducted a foundry operation for secondary metals consisting of the manufacturing of solder and casting metals, as well as tin-lead alloys. Metals are received in various forms from brokers and companies

Summary of Findings

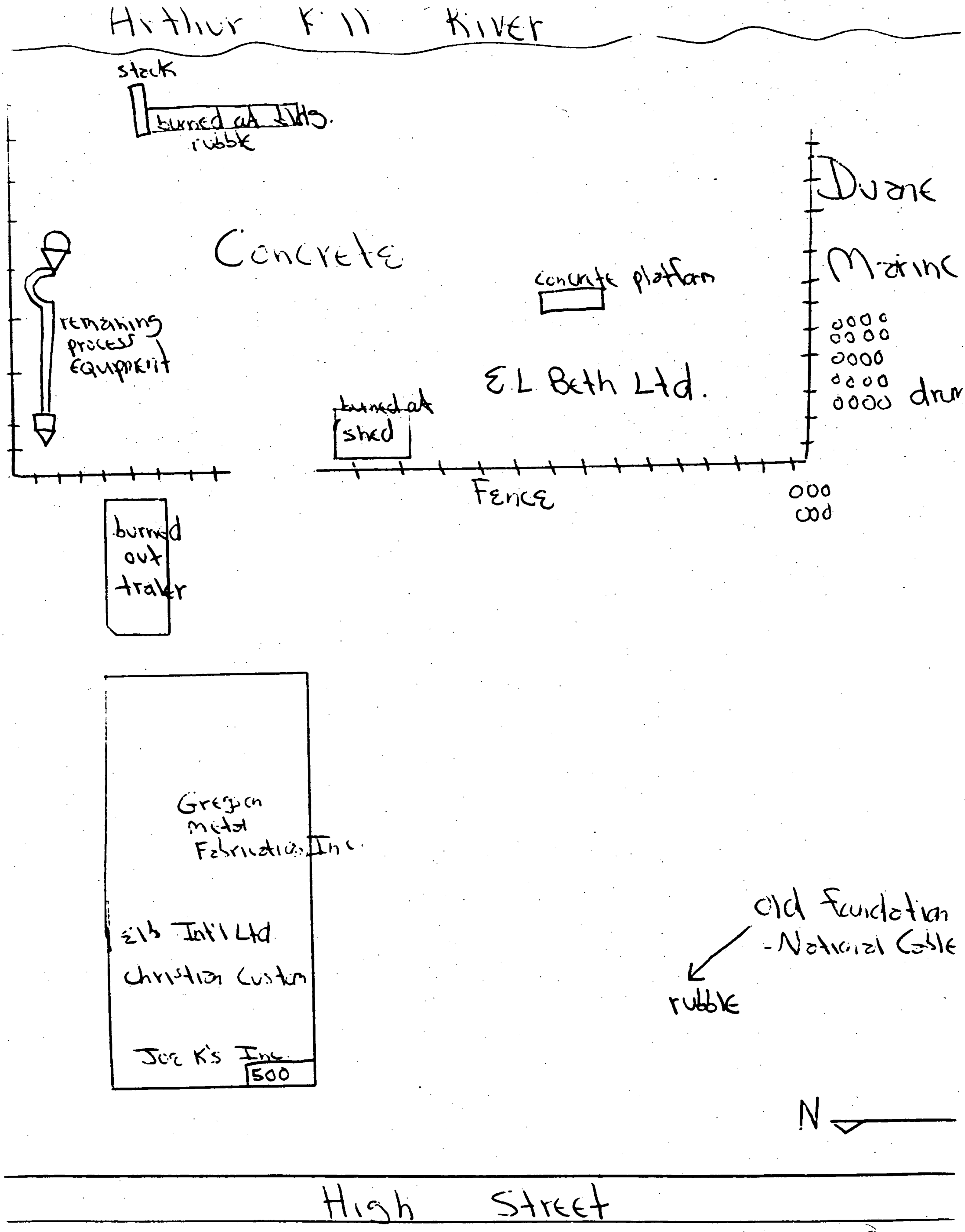
Facility Description and Operations

Raw materials are then placed into Kettles. The Kettles are hooded and all particulates are accumulated and fied into a baghouse system (3) baghouses. The sodder and emission control dust are then stored in bags and put into drums. From the Kettles melted material is alloyed and assayed and cast into various solid forms as per customer specifications (bars, ingots, pigs, saws, and hogs). Product was then sold to various customers such as General Motors, U.S Motors, and Delco.






7


Arthur Kill River
stack
burned out bldg.
rubble
Duane
Marine
Concrete
concrete platform
remaining process equipment
E.L. Beth Ltd.
drum
burned out shed
Fence
burned out trailer
Gregson Metal Fabrication Inc.
elb Int'l Ltd
Christian Custom
Joe K's Inc.
500
Old foundation - National Cable
rubble
N
High Street

REFERENCE NO. 5

TO: File thru Fred Sickels
FROM: Linda Zanelli
DATE: 1-17-85
SUBJECT: Phone Conversations -

1-16-85 - Contacted DEM - Hazardous Waste Management section and spoke with Fred Scerocchi to see if any manifest records could be found on E.L. Beth. Nothing could be found after 11/19/80, and prior to that time, the manifest # is needed to get information from micro-film.

1-16-85 - Contacted Edwin Lieu - HSMA. He stated that he had been on the E.L. Beth site on several occassions due to his interest in the Duane Marine site. E.L. Beth site had cleaned up satisfactorily after the fire (scrap metal, etc.) and he does not recall seeing any waste on-site

1-16-85 Contacted Bill Sharples - DEM - Engineering He requested that my report be sent to him in order to delist the company

REFERENCE NO. 6

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT
32 E. Hanover St., CN 028, Trenton, N.J. 08625

DR. MARWAN M. SADAT, P.E.
DIRECTOR

LINO F. PEREIRA, P.E.
DEPUTY DIRECTOR

Mr. Robert Silverman
E.L. Beth Limited
P.O Box 1769
Union, New Jersey 07083

14 FEB 1985

RE: E.L. Beth
500 High Street
Perth Amboy
NJD 067 484 923

Dear Mr. Silverman:

The Department has completed a file review of the above referenced facility. The Bureau has found adequate information to determine the facility's operating status under N.J.A.C. 7:26-1 et seq., The New Jersey Hazardous Waste Management Regulations.

The facility filed with the USEPA in August of 1980 for on-site generated hazardous waste storage in containers/drums (S01) at 2,500 gallons capacity. According to your March 14, 1983 letter, the facility closed in May of 1981. A facility site visit conducted by inspector L. Zaninelli, NJDEP, Central Field Office on January 16, 1985, revealed the site destroyed due to a fire.

Based upon the aforementioned events, the Department has reached the following conclusions regarding hazardous waste activity at the site:

(1) Hazardous waste site operations terminated on 5/18/81 due to a fire which destroyed the facility.

(2) No present or future hazardous waste activity occurs or will occur at this site.

Assuming the aforementioned conclusions are correct and complete, E.L. Beth's TSD facility as identified by the following USEPA identification number:

NJD 067 484 923

is excluded from applicable TSD facility regulations under N.J.A.C. 7:26-1 et seq.

This written acknowledgement of the exclusion of E.L. Beth from the New Jersey Department of Environmental Protection's list of existing hazardous waste TSD facilities is based expressly on the review of the aforementioned correspondence. This letter makes no claim as to the extent and physical conditions of the actual hazardous waste activities occurring at the site mentioned above.

The issuance of this delisting letter by the Department does not indicate, or imply, and should not be construed as a waiver of any requirements pursuant to the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and regulations promulgated thereunder concerning the New Jersey Pollutant Discharge Elimination System, N.J.A.C. 7:14-1 et seq. If your facility is in any of the regulated categories identified in the above cited regulations, you are hereby directed to apply for any and all permits necessary within ninety (90) days to the Bureau of Ground Water Discharge Permits, CN 029, Trenton, New Jersey 08625. Applications may be obtained by calling (609) 292-0424.

E.L. Beth's hazardous waste facility above is no longer included in DEP's list of "existing facilities" (see N.J.A.C. 7:26-1.4 and 12.3)and therefore does not need to conform with the interim operating requirements of N.J.A.C. 7:26-9 et seq., for "existing facilities". To operate a hazardous waste facility without prior approval from the DEP is a violation of the Solid Waste Management Act N.J.S.A. 13:1E-1 et seq.

If you have any questions on these matters, please contact Mr. William Sharples of my staff at (609) 984-4062.

Very truly yours,

Frank Coolick

Frank Coolick, Chief
Bureau of Hazardous Waste Engineering

EP6:lk
cc: A. Chang, USEPA, Region II
L. Zaninelli, CFO, Yardville

FEB 15 12 54 PM '85

REFERENCE NO. 7

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE MANAGEMENT
HAZARDOUS WASTE INSPECTION REPORT

DWM-029

HAZARDOUS WASTE MANAGEMENT FACILITY INSPECTION REPORT

FACILITY INFORMATION

FACILITY NAME: E.L. Beth LTD.

FILE NUMBER: 12-16-28

VHT FACILITY FILE NUMBER:

PERMIT #:

REGION: C

INSPECTION DATE: 6/4/90

INCIDENT/CASE NUMBER:

INSPECTION TYPE: TSD /RCRA

RESPONSIBLE AGENCY CODE:

INSPECTOR'S NAME: Pete Taylor

INSPECTOR'S AGENCY: NJDEP

INSPECTOR'S BUREAU: DHWM / BCE

EPA ID NUMBER: NJD 067484923

ADDRESS:

500 High Street

Perth Amboy

LOT: BLOCK:

COUNTY: middlesex

FACILITY PERSONNEL:

TELEPHONE #: 201-648-5050

OTHER STATE/EPA PERSONNEL: 2

REPORT PREPARED BY: Pete Taylor

REVIEWED BY:

DATE OF REVIEW: 6/9/90

TIME IN: ____________

TIME OUT: ____________

PHOTOS TAKEN (_) YES (✓) NO IF YES, HOW MANY? ____________

SAMPLE TAKEN (_) YES (✓) NO NO. OF SAMPLES ____________

NJDEP SAMPLE ID#: ____________

MANIFESTS REVIEWED (_) YES (✓) NO

Number of manifests in compliance ______

Number of manifests not in compliance ______

List manifest document numbers of those manifests not in compliance.

This Facility has been closed since 1985

GENERAL

GENERAL CHECKLIST

		YES	NO	N/A
7:26-7.4(a)1	Does the Generator have an EPA ID number?	✓		
HAZARDOUS WASTE DETERMINATION				
7:26-8.5(a)	Did the generator test its waste to determine whether it is hazardous?		✓	
7:26-8.5(b)	Did the generator determine the hazardous characteristics based upon knowledge of process?	✓		
	Is the waste hazardous?	✓		
7:26-8.5(d)	Were test results, waste analysis, or other determinations made in accordance with this section kept for three years from the date that the waste was last sent to an on-site or off-site TSF?	✓		
MANIFESTS				
7:26-7.4(a)4	Does each manifest have the following information? Please circle the elements missing and obtain a copy of the incomplete manifests. (List those manifests that are deficient on G-1).			
7:26-7.4(a)4i	The generator's name, address and phone number.			
7:26-7.4(a)4ii	The generator's EPA ID number.			
7:26-7.4(a)4iii	The hauler(s) name, address phone number and NJ registration.			
7:26-7.4(a)4iv	The hauler(s) EPA ID number.			
7:26-7.4(a)4v	The name, address and phone number of the designated TSD facility.			
7:26-7.4(a)4vi	The TSF's EPA ID number.			
7:26-7.4(a)4v	The name, address and phone number of the designated TSD facility.			
7:26-7.4(a)4vii	The name, type and quantity of hazardous waste being shipped, including such particulars as may be required regarding same?			
7:26-7.4(a)4viii	Special handling instructions and any other information required on the form to be shipped by generator?			

		YES	NO	N/A
7:26-7.4(3)	Did the generator describe all N.O.S. wastes in Section J?			
7:26-7.4(a)1x	When shipping hazardous waste to a waste reuse facility does the generator enter the waste reuse facility I.D. # in the section G of the Uniform Manifest?			
7:26-7.4(a)5	Before allowing the manifested waste to leave the generator's property, did the generator:			
7:26-7.4(a)5i	Sign the manifest certification by hand?			
7:26-7.4(a)5ii	Obtain the handwritten signature of the initial transporter and date of acceptance on the manifest?			
7:26-7.4(a)5iii	Retain one copy and forward one copy to the state of origin and one copy to the state of destination?			
7:26-7.4(a)5iv	Provide the required numbers of copies for: generator, each hauler, owner/operator of the designated facility, as well as one copy returned to the generator by the facility owner/operator?			
7:26-7.4(a)5v	Give the remaining copies of the manifest form to the hauler?			
7.26-7.4(f)	Has the generator maintained facility records for three (3) years? (Manifest(s), exception report(s) and waste analysis)			
7:26-7.4(h)1	Has the generator received signed copies of portion B (from the TSD facility) of all manifests for waste shipped off site more than 35 days ago?			
7:26-7.4(h)1	If not: Did the generator contact the hauler and/or the owner or operator of the TSDF and the NJDEP at (609) 292-8341 to inform the NJDEP of the situation?			
7:26-7.4(h)2	Have exception reports been submitted to the Department covering any of these shipments made more than 45 days ago?			

4

7:26-9.3

Accumulation Time

How is waste accumulated on site?

(✓) Containers
(__) Tanks (greater than 90 days)
(complete HWMF (TSD) Facility Checklist)
(__) Tanks (less than 90 days)
(__) Above ground
(__) Below ground
(__) Surface impoundments
(complete HWMF (TSD) Facility Checklist)
(__) Piles (complete HWMF checklist)

		YES	NO	N/A
7:26-9.3(a)1	Is waste accumulated for more than 90 days? when stored	✓		

STOP HERE IF THE HAZARDOUS WASTE MANAGEMENT FACILITY (TSF) CHECKLIST IS FILLED OUT.

No waste on site
since 1980

HAZARDOUS WASTE FACILITY STANDARDS

MANIFESTS

		YES	NO	N/A
7:26-7.4(a)4	Does each manifest have the following information? Please circle the elements missing and obtain a copy of the incomplete manifests. (List those manifests that are deficient on G-1).			
7:26-7.4(a)4i	The generator's name, address and phone number.	___	___	___
7:26-7.4(a)4ii	The generator's EPA ID number.	___	___	___
7:26-7.4(a)4iii	The hauler(s) name, address phone number and NJ registration.	___	___	___
7:26-7.4(a)4iv	The hauler(s) EPA ID number.	___	___	___
7:26-7.4(a)4v	The name, address and phone number of the designated TSD facility.	___	___	___
7:26-7.4(a)4vi	The TSF's EPA ID number.	___	___	___
7:26-7.4(a)4v	The name, address and phone number of the designated TSD facility.	___	___	___
7:26-7.4(a)4vii	The name, type and quantity of hazardous waste being shipped, including such particulars as may be required regarding same?	___	___	___
7:26-7.4(a)4viii	Special handling instructions and any other information required on the form to be shipped by generator?	___	___	___

		YES	NO	N/A
7:26-7.4(3)	Did the generator describe all N.O.S. wastes in Section J?	___	___	___
7:26-7.4(a)ix	When shipping hazardous waste to a waste reuse facility does the generator enter the waste reuse facility I.D. # in the section G of the Uniform Manifest?	___	___	___
7:26-7.4(a)5	Before allowing the manifested waste to leave the generator's property, did the generator:	___	___	___
7:26-7.4(a)5i	Sign the manifest certification by hand?	___	___	___
7:26-7.4(a)5ii	Obtain the handwritten signature of the initial transporter and date of acceptance on the manifest?	___	___	___
7:26-7.4(a)5iii	Retain one copy and forward one copy to the state of origin and one copy to the state of destination?	___	___	___
7:26-7.4(a)5iv	Provide the required numbers of copies for: generator, each hauler, owner/operator of the designated facility, as well as one copy returned to the generator by the facility owner/operator?	___	___	___
7:26-7.4(a)5v	Give the remaining copies of the manifest form to the hauler?	___	___	___
7.26-7.4(f)	Has the generator maintained facility records for three (3) years? (Manifest(s), exception report(s) and waste analysis)	___	___	___
7:26-7.4(h)1	Has the generator received signed copies of portion B (from the TSD facility) of all manifests for waste shipped off site more than 35 days ago?	___	___	___
7:26-7.4(h)1	If not: Did the generator contact the hauler and/or the owner or operator of the TSDF and the NJDEP at (609) 292-8341 to inform the NJDEP of the situation?	___	___	___
7:26-7.4(h)2	Have exception reports been submitted to the Department covering any of these shipments made more than 45 days ago?	___	___	___

Comment deleted? 2/14/85

		YES	NO	N/A
7:26-9.4(b)	Waste Analysis			
7:26-9.4(b)1i	Is there a detailed chemical and physical analysis of a representative sample of the waste(s) or each waste? (At a minimum, this analysis most contain all the information necessary for proper treatment storage or disposal of the waste).	Records Behind		
7:26-9.4(b)1iii	Does the character of the waste handled at the facility change from day to day, week to week, etc., thus requiring frequent testing? Check only one:			
	Waste characteristics vary:			
	All waste(s) are basically the same:			
	Company treats all waste(s) as hazardous:			
7:26-9.4(b)2	Is there a written waste analysis plan at the facility?			
	Does it contain:			
7:26-9.4(2)i	Parameters for which each hazardous waste stream will be analyzed including constituents listed in NJAC 7:26-8.16 and the rational for the selection of these parameters?			
7:26-9.4(b)2ii	The test methods which will be used to test for these parameters?			
7:26-9.4(b)2iii	The sampling method which will be used to obtain a representative sample of the waste to be analyzed?			
7:26-9.4(b)2iv	The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up-to-date?			
7:26-9.4(b)2v	For off-site facilities, the waste analysis that hazardous waste generators have agreed to supply?			
7:26-9.4(b)2vii	Procedures which will be used to identify changes in waste stream characteristics?			
	Does hazardous waste come to this facility from an outside source? (e.g., another generator).			
	If yes, list the name(s) of generators.			

		YES	NO	N/A
7:26-9.4(b)4	If waste comes from an outside source, are there procedures in the waste analysis plan to insure that waste received conforms to the accompanying manifest?			
	Does the plan describe:			
7:26-9.4(b)4i	The procedures which will be used to determine the identity of each shipment of waste managed at the facility?			
7:26-9.4(b)4ii	The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling?			
7:26-9.4(c)1	Did the facility accept hazardous waste which it is not authorized to handle?			
7:26-9.4(i)	Are all records and results of waste analysis performed pursuant to NJAC 7:26-9.4(b) and 9.4(e) as applicable written in the operating log?			
7:7:26-9.4(h)	**Security** Facility Closed			
	Does the facility have: & Delisted			
7:26-9.4(h)1i	A 24 hour surveillance system which continuously monitors and controls entry onto the active portion of the facility?			
7:26-9.4(h)1ii	An artificial or natural barrier, which completely surrounds the active portion of the facility; and a means to control entry, at all times, through the gates or other entrances to the active portion of the facility?			
7:26-9.4(h)3	Are there "Danger-Unauthorized Personnel Keep Out" signs posted at each entrance to the facility?			
	If no, explain what measures are taken for security.			

		YES	NO	N/A
7:26-9.4(f)	**General Inspection Requirements**			
7:26-9.4(f)1	Does the owner or operator inspect the facility for malfunctions and deterioration, operator errors and discharges which may be causing, or may lead to:			
7:26-9.4(f)ii	Discharge of hazardous waste constituents to the environment?			
7:26-9.4(f)iii	A threat to human health?			
7:26-9.4(f)3	Has the owner or operator developed, and does the owner or operator follow a written schedule for inspecting monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment that are utilized for the prevention, detection or response to environmental or human health?			
7:26-9.4(f)3i	Did the owner or operator submit the written inspection schedule to the department?			
	If yes, when was it submitted?			
7:26-9.4(f)3iii	Is the written inspection schedule kept at the facility?			
7:26-9.4(f)3iv	Does the schedule identify the types of problems to be looked for during the inspection?			
7:26-9.4(f)3v	Does the schedule include the frequency of inspection, based upon the rate of possible deterioration of the equipment and the probability of an environmental, or human health incident if the deterioration or malfunctions or any operator error goes undetected between inspections?			
7:26-9.4(f)5	Is there evidence that problems reported in the inspection log have not been remedied?			
7:26-9.4(f)6	Does the owner/operator record inspections in a log?			

		YES	NO	N/A
7:26-9.4(f)6	Are these records kept for at least three (3) years from the date of inspection?			
7:26-9.4(f)6	Does the records include the date, and time of the inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial action?			
7:26-9.4(g)	Personnel Training			
	Have facility personnel successfully completed a program of classroom instruction or on-the-job training within six months of having been employed?			
7:26-9.4(g)2	Is the program directed by a person trained in hazardous waste management procedures and does it include instruction which teaches facility personnel hazardous waste management procedures (including contingency plan implementation) relevant to the positions in which they are employed?			
7:26-9.4(g)5	If yes, have facility personnel taken part in an annual review of training?			
	Is there written documentation of the following:			
7:26-9.4(g)6i	Job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job?			
7:26-9.4(g)6ii	A written job description for each position related to hazardous waste management?			
7:26-9.4(g)6iii	A written description of the type and amount of both introductory and continuing training given to personnel in jobs related to hazardous waste management?			
7:26-9.4(g)6iv	Documentation of actual training or experience received by personnel?			

Facility closed over ~~[illegible]~~ 3 yrs
Records Burned

		YES	NO	N/A
7:26-9.8(e)1i	A description of how and when the facility will be partially closed (if applicable) and ultimately closed?	—	—	+
7:26-9.8(e)1ii	The maximum extent of the operation which will be open during the life of the facility?	—	—	+
7:26-9.8(e)2	An estimate of the maximum inventory of wastes in storage or in treatment at any given time during the life of the facility?	—	—	+
7:26-9.8(e)3	A description of the steps needed to decontamination facility equipment during closure?	—	—	+
7:26-9.8(e)4	A schedule for final closure including the anticipated date when the wastes will no longer be received, the date when completion of final closure is anticipated, and intervening milestone dates which will allow tracking of the progress of closure?	—	—	—

Post Closure Plan Not needed

		YES	NO	N/A
7:26-9.9(g)	Does the facility have a written post-closure plan kept at the facility?	—	—	+
	If yes, does the plan:			
7:26-9.9(i)	Identify the activities which will be carried on after closure and the frequency of these activities?	—	—	+
7:26-9.9(i)1	Include a description of the planned ground water monitoring activities and frequencies at which they will be performed?	—	—	+
7:26-9.9(i)2	Include a description of the planned maintenance activities, and frequency at which they will be performed, to insure the following:	—	—	+
7:26-9.9(i)2i	The integrity of the cap and final cover or other containment structures where applicable?	—	—	+
7:26-9.9(i)2ii	Describe the function of the facility monitoring equipment?	—	—	+

YES NO N/A

7:26-9.9(i)3 Include the name, address and phone number of a person or office to contact about the disposal facility during the post-closure period? __ __ __

Does the owner/operator have a written estimate of the cost of post-closure for the facility? __ __ __

If yes, what is it?

Please circle all appropriate activities and answer questions in appropriate sections all activities circled.

Storage	Treatment	Disposal
Container	Tank	Landfill
Tank, Above Ground	Surface Impoundments	
Tank, Below Ground	Incineration	Surface Impoundments
Surface Impoundments	Thermal Treatment	Other ____________
Waste Piles		
Other ____________	Chemical, Physical and Biological Treatment	
Other ____________		

7:26-9.4(d) Containers

None on site since 1980

What type of containers are used for storage? Describe the size, type, quantity and nature of wastes (e.g., 12 fifty-five gallon drums of waste acetone).

7:26-9.4(d)1i Do the containers appear to be o sturdy leakproof construction of adequate wall thickness, weld, hinge and seam strength, and of sufficient material strength to withstand side and bottom shock, while filled, without impairment of the container's ability to contain hazardous waste? __ __ __

If no, explain.

Inspector: Taylor
Address: Twin Rivers Prof Bldg
East Windsor NJ
Telephone No: 609-426-0700

RCRA LAND DISPOSAL RESTRICTION
GENERATOR CHECKLIST

I. HANDLER IDENTIFICATION

A. Handler Name: EL Beth LTD.

B. Street (or other identifier): 502 State ST

C. City: Perth amboy

D. State: N.J.

E. Zip Code:

F. County Name: Middlesex

G. Nature of Business; Identification of Operations: SIC Code(s): Foundry 5051

H. EPA ID #: NJD067484923

I. Handler Contact (Name and Phone Number): Robert Silverman 201-688-5050

II. GENERATOR COMPLIANCE

Comments

A. Waste Identification

1. F-Solvents

a. Does the handler generate the following wastes?

~~(i) F001, F002, F004, or F005~~ ___Yes ___No

(ii) F003 ___Yes ___No

If an F003 wastestream (listed solely for ignitability) has been mixed with a non-restricted solid or hazardous waste, does the resultant mixture exhibit the ignitability characteristic? ___Yes ___No

b. Source of the above: Form 8700-12 ___; Part A ___; Part B ___; Biennial/Annual Reports ___ other (specify) ___

Appendix A is intended to assist the inspector and enforcement official in determining whether the facility is generating F-solvent wastes, if such wastes were not identified by the facility previously. If you are concerned that F-solvent wastes may be misclassified or mislabeled, turn to Appendix A-1. To assist in identfying potentially

This facility has been closed and delisted since 2/14/85. ~~Prior~~ They have not produced any wastes since 1980. Prior to 1980 They produced a bag house waste which was classified as hazardous

SUMMARY OF FINDINGS

FACILITY DESCRIPTION AND OPERATIONS

EL Beth was a foundry operation which manufactured solder, casting metals, and lead alloys.

This site is situated at 500 State Street, Perth Amboy. The site borders the Arthur Kill.

This facility has not been in operation since 1981, at which time it was completely destroyed by fire. This fire destroyed all hazardous waste manifests as well as other company records.

On 1/16/85 Linda Zaninelli, NJDEP-DHWM/BCE, conducted a RCRA inspection at this facility. At that time the company had applied for closure. This closure was granted, and the company was delisted by the NJDEP - DHWM, Bureau of Hazardous Waste Engineering on 2/14/85.

DESCRIBE THE ACTIVITIES THAT RESULT IN THE GENERATION OF HAZARDOUS WASTE.

No waste has been generated by this facility since 11/19/80. Prior to that time baghouse dust was the only waste generated at this site.

IDENTIFY THE HAZARDOUS WASTE LOCATED ON SITE, AND ESTIMATE THE APPROXIMATE QUANTITIES OF EACH (IDENTIFY WASTE CODES).

None.

CMEL FORM

COMPANY DATA

EPA ID NUMBER: NJD067484923
FACILITY NAME: ELBETH LTD
FY/QUARTER: 1
CONTACT: R. SILVERMAN
FACILITY PHONE: (201) 688 5050
FACILITY STREET: 500 E STATE
COUNTY/MUNIC. CODE: 12-16
FACILITY CITY: PERTH AMBOY
FACILITY STATE: NJ
FACILITY ZIP: ___
CORPORATE NAME: Cant Field Metal group
CORPORATE STREET: PO BOX 3100
CORPORATE CITY: UNION
CORPORATE STATE: NJ
CORPORATE ZIP: 07083
CORPORATE PHONE: (201) 688-5050
CORPORATE CONTACT: R SILVERMAN
FILE NUMBER: 12-16-28
REGION CODE: C

INITIAL INSPECTION [✓]

INITIAL INSPECTION DATE: 6/4/90
MANDATORY: (Y/N) Y
DATE NOV ISSUED: ___
DATE VIOLATIONS REFERRED: ___
AGENCY REFERRED TO: ___
INCIDENT CASE NUMBER: ___
LAND BAN (Y/N) Y
SITE VISIT? (Y/N) Y
FEE: (Y/N) N
SCHEDULED COMPLIANCE DATE: ___
DATE COMPLIANCE ATTAINED: ___
INSPECTOR/REVIEWER: Taylor
DATE ASSIGNED: 4/1/90
DATE REVIEWED: 6/9/90
REGULATORY STATUS: 03
EVALUATION TYPE CODE: 01
GRANT CODE: 03

FOLLOWUP INSPECTION [ ]

FOLLOWUP INSPECTION DATE: ___
SITE VISIT: (Y/N)
INSPECTOR/REVIEWER: ___
DATE REPORT REVIEWED: ___
EVALUATION TYPE CODE: ___
GRANT CODE: ___

CMEL GRID FOR
[✓] INITIAL [ ] FOLLOWUP

CLASS OF VIOLATION	GW	CLO	$$$	PTB	SCH	MNF	LDB	OTH
I*						O		O
I						O		O
II						O		O

(ENTER Z, X, O, H OR C IN THE APPROPRIATE BOX.)

Z=UNDETERMINED OR UNDER INVESTIGATION
X=VIOLATION
O=NO VIOLATION
H=HIGH PRIORITY VIOLATOR
C=FACILITY NOT IN COMPLIANCE WITH CORRECTIVE ACTION COMPLIANCE SCHEDULE IN AN ORDER OR PERMIT

AREAS OF EVALUATION:
- GW=GROUND WATER
- CLO=CLOSURE
- $$$=FINANCIAL RESPONSIBILITY
- PTB=PART B
- SCH=COMPLIANCE SCHEDULE
- MNF=MANIFEST
- LDB=LAND BAN
- OTH=OTHER

COMMENTS: ___

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL BUREAU OF FIELD OPERATIONS
DAILY ACTIVITY/MILEAGE LOG

NAME: Taylor ID #: 2572 DATE: 6/4/90

DEPARTED: 7:20 ARRIVED: 8:30
ODOM. IN: 28855 ODOM. OUT: 28963
DEPARTED: 950

SITE NAME: Burlington County Transit Station
MUNICIPALITY: ~~Bor~~ Florence
COUNTY: Burlington
INCIDENT#/PAC #: 90-05-31-1022

HAZARDOUS WASTE INSPECTIONS

RCRA GRANT ACTIVITIES
[ ] GENERATOR
[ ] LDF-CEI
[ ] TSF'S (TSD'S)
[ ] PERMITTED FACILITY
[ ] COMMERCIAL FACILITY
[ ] SAMPLING
[ ] COMPLIANCE INSPECTION
[ ] TRANSPORTER AUDIT
[ ] FIELD NOV ISSUED
[ ] WITH LAND BAN

FEE BASED INSPECTIONS
[ ] MAJOR FACILITY (WEEKLY)
[ ] NON-MAJOR FACILITY
[ ] GENERATOR
[ ] TRANSPORTER
[ ] TSD
[ ] FIELD NOV ISSUED
[ ] COMPLIANCE INSPECTION
[ ] SAMPLING EPISODE

SUMMONS PROGRAM
[ ] SUMMONS ISSUED
[ ] COURT APPEARANCE

of pesticides case
SPILL/HW INVESTIGATIONS
[✓] INITIAL INVEST.
[ ] FOLLOWUP INVEST.
[ ] SAMPLING
[ ] CLEANUP MONITORING
[ ] CRIM. JUSTICE INV.
[ ] ABANDONED DRUMS
[ ] POTABLE WATER
[ ] GROUND WATER
[ ] SURFACE WATER
[ ] RP KNOWN
[ ] RP UNKNOWN

[ ] LUST
[ ] LAST
CHECK APPLICABLE
[ ] PETRO.PROD
[ ] HOMEOWNER
[ ] MEETING
[ ] OTHER
[ ] FIELD NOV ISSUED
[ ] CLEANUP RP FUND
[ ] SPILL FUND

RP COST $ ~~——~~

FINDINGS:

No Futher
Action
Required

REFERENCE NO. 8

Field Book
748212

Projects (continued)

Na

Ac

Pr

Tl
sp
a

J030 ①

EL Beth Ltd

Table of Contents

Claire Barnett March 4, 1992 [illegible] 3/4/92

(2) J030

EL Beth Ltd March 4, 1992

OVA serial #(EPA #) 729633. Background reading: <0.2 ppm
HNU: EPA Serial # 729622. Background reading: 0 ppm
monitor-4, EPA Serial # 734665. Background: <1 cpm.

Camera for prints: EPA# 734745
Camera for slides: EPA# 734743

Claire Barris March 4, 1992
K. Campbell 03/09/92

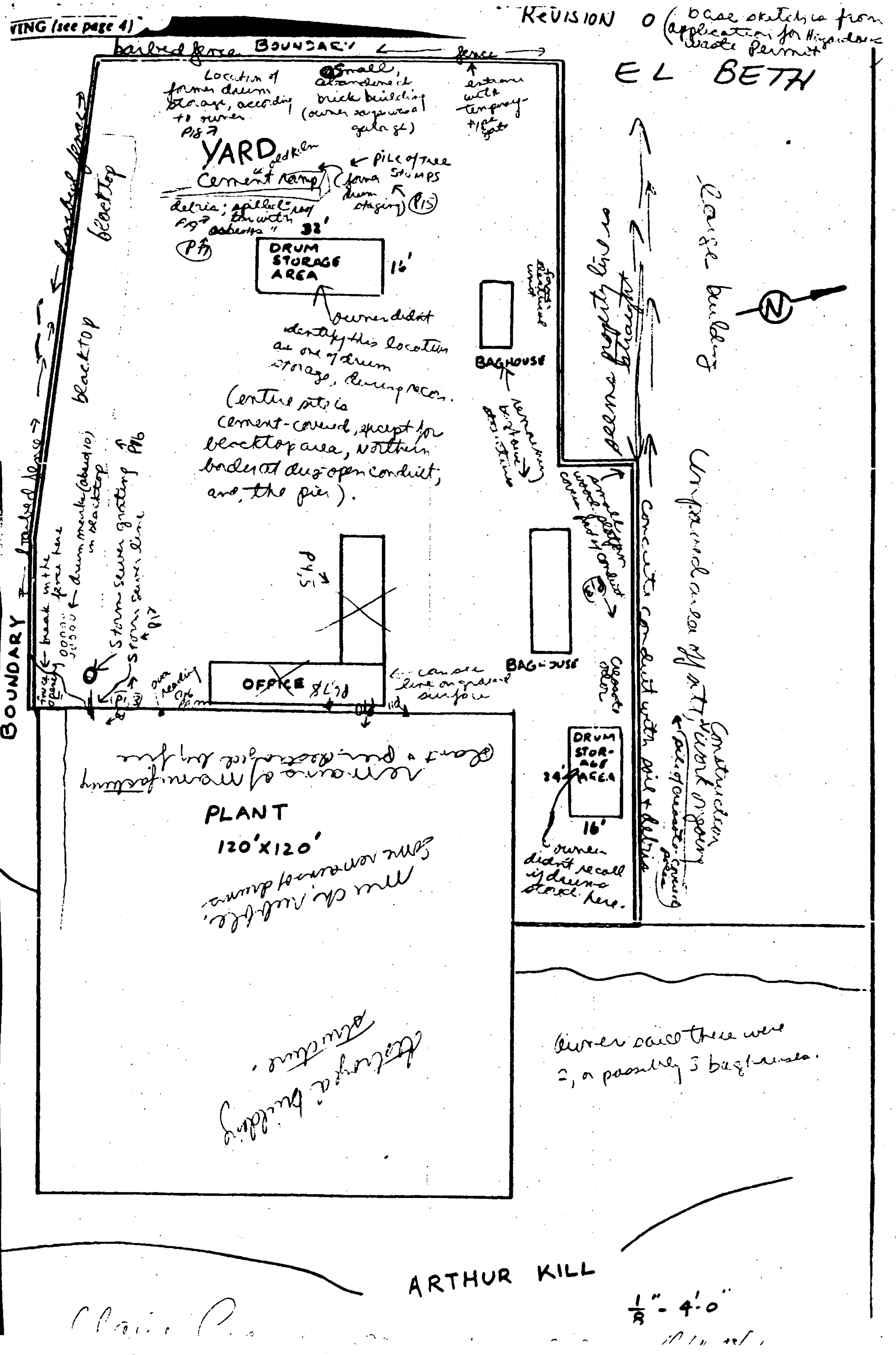
J030
March 4, 1992 (3)

ELBeth Ltd
Perth Amboy, New Jersey
Wednesday, March 4, 1992
ON-Site RECONNAISSANCE

HNUS Personnel:
Claire Barrio - Site Manager
Nick Kides - SURVEILLANCE Support NK 3/4/92
Barry VROEGINDAY - Site Safety officer BJV 3/4/92
(The above personnel have read and understand the site work plan and safety plan). CB 3/4/92

Arrive at property at 0930. Met Mr. Jack Silverman, Robert Silverman and Carol Sungens. We looked over tax map, clarifying where on block property lines. Now we're entering site.
Weather: Sunny, hazy, cool, about 40°F, calm breeze from the east-northeast
0937 Holding tailgate meeting.
Barry's reviewing site hazards, ~~potential~~ contaminants and ppe.
1010 Instrument setup, background readings, suiting up completed. I'm briefly going over recon with Barry, Nick.

Claire Barrio March 4, 1992
K. Campbell 03/09/92



VING (see page 4)
REVISION 0
base sketch is from application for Hazardous Waste Permit
EL BETH
BOUNDARY
barbed fence
fence
YARD
cement ramp
pile of tree stumps
32'
DRUM STORAGE AREA
16'
owner didn't identify this location as one of drum storage, during recon.
BAGHOUSE
blacktop
barbed fence
(entire site is cement-covered, except for blacktop area, northern border at dug open conduit; and, the pier).
Storm sewer grating
Storm sewer line
BAG-HOUSE
OFFICE
DRUM STORAGE AREA
24'
16'
owner didn't recall if drums stored here.
PLANT
120'X120'
Concrete conduit with oil + debris
large building
owner said there were 2, or possibly 3 baghouses.
ARTHUR KILL
1/8" - 4'0"

EL Beth Ltd

J030
March 4, 1992 (5)

1014 hrs Mr. Bob & Jack S. (their company purchased existing facility late 1977 at about late 1977). (They are relating site history to me). In operation 1978 - 1981 as subsidiary of parent company M.C. Canfield.

Property is in their names as individuals now.

Company (ca 3/4/92) owned by M.C. Canfield & (then) Mr. Silverman (Jack & Bob Silverman) remained as property owners.

Co. made solder, casting metals. Used Virgin metals, refined & factory secondary metals.

Some of their raw material was by-product from their material suppliers. They recycled, reused here.

This reused material was ammonium chloride, that came with scrap solder, he said.

Mr. Silverman said:

Property has been paved as long as they have been owners. i.e. - he said paved before he bought. 3/4/92 Drum storage ~~was~~ at W edge of property next to garage for raw materials.

Mr. Bob Silverman said the baghouse dust was recycled.

Claire [illegible] March 4, 1992 [illegible signature] 03/04/92

J030

(6) EL Beth Ltd March 4, 1992

owner said that drums of waste were very heavy - could be about 2000 lb each.

Claire Bourgeois March 4, 1992
K. Campbell 03/09/92

J030

EL Beth Ltd March 4, 1992 (7)

posts of the drum storage area by the former garage can be seen (I do not see all four)
Much waste volume - "there may not be removal documentation because waste pressed" (
Ms Suzens said there was no DEP cleanup requirement after the fire - "back then less requirements", she said.)
(according to on-site talk with owner's attorney) 3/4/92

SE part of site, Storm sewer grating; small (~ 6' X 12') asphalt area with stern drum marks. (blacktop).
fence in this area is broken, open, by pier.

1038 hrs. Barry & Nick are checking storm sewer, with open grating
Barry detected 0.6 ppm with OVA, after stone dropped into storm sewer.

Graffitti present on burned building, Mr. Jack Silverman noted kids did the graffitti.

1043 we're at edge of concrete looking at burned remains of buildings - An above-ground tank had heating oil, Ms. Suzens said.

Claire Bourgeois March 4, 1992 K. Campbell 03/09/92

(8) J030
EL Beth Ltd

Kampbell 03/04/92

J030
EL Beth Ltd March 4, 1992 (9)

1045 Photos P1 through P5, and S1 through S5 - panoramic view of property taken from SE corner of paved part of property (land portion of site)

Barry has OVA reading of 0.6 PPM at edge of concrete (not soil there) by ~~[illegible]~~ group of cast iron conduits (perhaps sewer) (possibly storm sewer line). There is no response on HNU

1048 Photos P6 through P8 - panoramic view facing pier of burned building at pier.

1050 Closer view South edge of burned pier (Photos P9, S9)

1051 Photo P10, S10, of burned plant at pier facing S-SE.

Barry has spike readings on OVA up to 0.8 PPM at hole at concrete - soil (pier) interface

Claire Bump March 4, 1992 Kampbell 03/04/92

0.8 to 1 ppm on OVA at 1100 hrs at NE corner of land area of site. (wind from NE also) by creosote logs

1055 photo P11-S11 of location where Barry had 0.8 ppm OVA reading., Photo facing E ~~SE~~ 3/27/92

1058 photo P12, S12 photograph of location of storm sewer, asphalt where drum marks noted, facing SE.

1100 walking along N ~~E~~ 3/4/92 site border at NE corner of land area, strong odor (creosote); there are creosote covered large logs right at adjacent property, about 20 feet away.

1105 photo of residence + adjacent lot, facing NE ~~SE~~ 3/27/92 P13, S13

1110 Photo # P14, S14, remaining baghouse equipment

1112 Photo # P15, S15 facing West, debris (tree) and, site border, ramp + garage.

1115 Photo # P16, S16 facing S-SE

(12) J030

EL Beth Ltd March 4, 1992

✓1120 hrs - by debris at ramp (former drum shipping area) is an overturned bucket; Nick read label - roofing tar with asbestos. Also, is can, about 1 gallon size - label reads (partly) "another pentachlorophenol product". I'm not approaching it to read further, as it seems is uncapped. Owner is holding the can now. (I indicated he should have a glove on).

By baghouse area (it's a large metal structure) seems compass isn't working properly. Note to check compass readings against map.

Claire Bourque March 4, 1992

K. Campbell 03/04/92

J030

EL Beth Ltd March 4, 1992 (13)

~~Site~~ border, & blacktop area (~20' in from fence)

1117 hrs.

P17, S17 ramp formerly for drum storage.

1119 P18, S18 former drum storage area, and, garage, facing W.

small bucket, tar and asbestos = roofing tar with asbestos" (Nick read & related to me).

photo of bucket 1120 hrs P19, S19.

They believe there were no transformers - electricity came from street, they said.

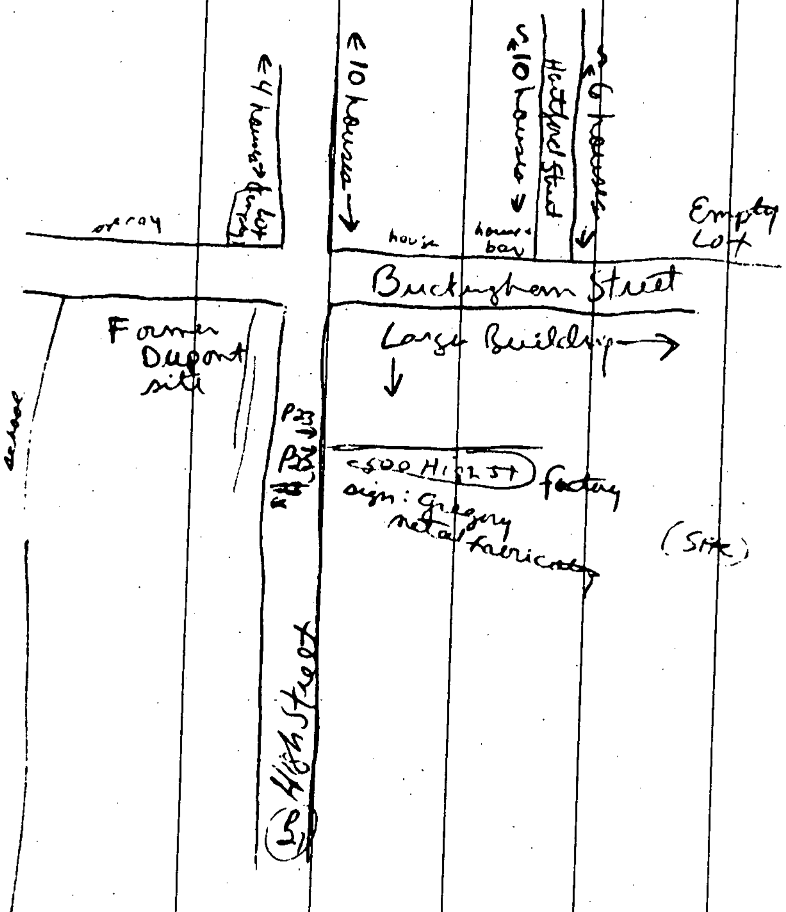
1125 Photo P20, S20 part of bag house & some electrical equipment ~~elec equip~~ cb 3/4/92 equipment cb 3/4/92

Note: brick shed ("garage") by entrance seems to have debris. I did not inquire if anything is now stored in it. No readings were taken at shed.

1135 Leaving site.

Claire Bourque March 4, 1992 K. Campbell 03/04/92

(14) J030
El Beth Ltd March 4, 1992
offsite recon.



Claire Barrup March 4, 1992
K. Campbell 03/04/92

J030
El Beth Ltd March 4, 1992 (15)
Offsite recon.

Drove along area near site to note if there are houses, and if schools, etc present.

1149: Photo of ~~Lot~~ Block (cc 3/4/92) 238, lots (industrial) adjacent to site. Taken from High Street.

1150: Photo of property entrance, 500 High Street

1151 Photo at property entrance with sign, "500 High Street"

Claire Barrup March 4, 1992
K. Campbell 03/04/92

J030

(16) El Beth Ltd March 4, 1992

Photograph Log - ON-SITE Reconnaissance

Time	Description	Photo#
1045	Panoramic view of site taken from SE corner of land portion of property; facing W to NE.	P1-P5 S1-S5
1048	Panoramic view of burned building, pier.	P6-P8 S6-S8
1050	Closer view, south edge of burned pier	P9, S9
1051	Burned manufacturing plant, facing S-SE.	P10, S10
1055	Location of 0.8 ppm OVA reading. facing E-SE	P11, S11
1058	Location of storm sewer and, blacktop with drum marks. facing SE	P12, S12
1105	Conduit and adjacent lot	P13, S13
1110	Remaining baghouse equipment	P14, S14
1112	facing west; pile of tree debris; former drum ramp; "garage"	P15, S15
1115	facing S-SE	P16, S16

Claire Barnes March 5, 1992
K. Campbell 03/09/92

J030

El Beth Ltd entered March 5, 1992 (17)

Photograph Log - On-site reconnaissance, continued:

Time	Description	Photo#
1117	former ramp for drum handling	P17, S17
1119	facing west former drum storage area, and, "garage".	P18, S18
1120	Photo of overturned bucket of roofing tar with asbestos	P19, S19
1125	Photo of part of baghouse, and, some electrical equipment	P20, S20

Photos taken off-site 3/4/92

Time	Description	Photo#
1149	Photo of Block 238, with lots adjacent to site; taken from High Street.	P21, S21
1150.	Property entrance	P22, S22
1151	Property entrance, showing sign.	P23, S23

Claire Barnes March 5, 1992
K. Campbell 03/09/92

REFERENCE NO. 9

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth Ltd file
DATE: March 27, 1992
FROM: Claire Barupis
COPIES: —
SUBJECT: Waste Quantity Reported for the EL Beth site.
REFERENCE: noted below

Through discussion with Hanna Majcejko of U.S. EPA, Permits Administration Branch, the correct waste quantity figures for the EL Beth Ltd. Hazardous Waste Permit Application dated November 18, 1980 have been determined. The figures that appear in the file copy are 1000 times greater than the values entered by the applicant; this is because in the past, EPA added the additional zeros to the form for the purpose of filling in a field in data entry. The correct values are:

Part III, process design capacity, S01 = 2500 G

Part IV, estimated annual quantity of waste:

K069, 20,000 P
D002, 10,000 P
"D000", 20,000 P

NUS 443A 58 1182

REFERENCE NO. 10

GEOHYDROLOGY AND DIGITAL-SIMULATION MODEL OF THE FARRINGTON AQUIFER IN THE NORTHERN COASTAL PLAIN OF NEW JERSEY

By George M. Farlekas

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 79-106

Prepared in cooperation with
New Jersey Department of Environmental
Protection, Division of Water Resources

August 1979

CONTENTS

(2)

ABSTRACT

A two-dimensional digital-computer flow model was developed to simulate the Farrington aquifer in the northern part of the Coastal Plain of New Jersey. The area of detailed study includes approximately 500 square miles in Middlesex and Monmouth Counties where the aquifer provides a large part of the municipal and industrial water supply. The area modeled is much larger, extending seaward as well as northeastward into Long Island.

The aquifer consists chiefly of the Farrington Sand Member of the Raritan Formation and is composed of sand and some gravel. It thickens from a featheredge in outcrop to more than 170 feet, 11 miles to the southeast. The confining unit between the Farrington and the overlying Old Bridge Sand Member of the Magothy Formation consists primarily of the Woodbridge Clay Member of the Raritan Formation and has a maximum thickness of 244 feet.

The model simulates both water-table and artesian conditions. The confining unit overlying the Farrington aquifer is simulated as having a variable thickness and vertical hydraulic conductivity. The effect of a declining water level in the overlying Old Bridge aquifer on the Farrington aquifer is also simulated by the model.

Values used to describe the hydraulic properties of the Farrington aquifer are: a hydraulic conductivity of 105 feet per day, a storage coefficient of 1.6×10^{-4} for artesian conditions, and a specific yield of 0.25 for water-table conditions. Values for the overlying confining unit are: a vertical hydraulic conductivity ranging from 4.2×10^{-7} to 1.0×10^{-10} feet per second and a specific storage of 4×10^{-5} feet^{-1}.

Aquifer simulation for the 15-year period, 1959-73, was used to calibrate the model. The model was calibrated by comparing the observed potentiometric surface of November 1973 with the simulated potentiometric surface. In addition, hydrographs for selected wells were compared with model results. Ground-water withdrawals for 1959 and 1973 were 12.1 and 28.5 million gallons per day, respectively.

Potentiometric surfaces for 1985 and 2000 were computed based on a linear projection of ground-water withdrawals (39.5 and 56.9 million gallons per day in 1985 and 2000, respectively) of the period 1959 through 1973. These surfaces are deeper than that of November, 1973, and the cone of depression is wider. The potentiometric head projected by the model in the vicinity of Sayreville will be more than 150 feet below mean sea level by 2000; the head in this area was 70 feet below sea level in 1973.

The model calculated ground-water budgets for steady-state and transient conditions for the entire modeled area and for several rectangular subareas. Ground-water flow into the modeled Farrington aquifer under steady-state conditions before

ground-water development was 16 cubic feet per second for the entire area. Recharge in the outcrop area and vertical leakage from the Old Bridge was 8 cubic feet per second each. Approximately 75 percent of the discharge occurred as seepage into surface-water bodies in and near the outcrop and as lateral flow southwestward into Burlington County near the outcrop area. The remaining 25 percent occurred southeast of the outcrop as vertical leakage into the overlying Old Bridge aquifer and as lateral flow to the south into Ocean and Burlington Counties.

A transient water budget for 1973 was calculated for a subarea consisting mainly of Middlesex County. The model indicates that 48 percent (14.3 cubic feet per second) of the total inflow to the subarea was through its boundaries. Other sources of water include direct recharge within the subarea (5.4 cubic feet per second), vertical leakage (mainly from the Old Bridge) within the subarea (2.6 cubic feet per second), and water released from storage (3.4 cubic feet per second). Discharge from the subarea consisted mainly of withdrawals (26.5 cubic feet per second). It also included vertical leakage to the Old Bridge and discharge to surface-water bodies simulated by constant-head nodes (3.2 cubic feet per second).

INTRODUCTION

Purpose and Scope

The purpose of this study is to simulate the hydrology of the Farrington aquifer using a computer-simulation model so that the effects of alternative withdrawal schemes can be evaluated quantitatively. The primary study area consists of the northern part of the New Jersey Coastal Plain. The area modeled is much larger, extending seaward and also to the northeast into Long Island. This report discusses the geohydrology of the Farrington aquifer, the simulation model, and the effects of projected withdrawals from the Farrington aquifer. Saltwater intrusion, one of the limiting factors of future development of the aquifer, had not been investigated during this study. This study by the U.S. Geological Survey was done in cooperation with the Division of Water Resources of the New Jersey Department of Environmental Protection.

Location and Extent

The primary area of study consists of approximately 500 mi^2, including parts of Middlesex, Monmouth, and Mercer Counties (fig. 1). The modeled area is much larger, incorporating additional areas of New York and New Jersey. To the northeast, the model extends into Long Island. The southeastern boundary of the model is approximately 60 mi offshore. The southwestern boundary extends to the southwestern limit of Monmouth County. The total area simulated by the model is approximately 7,500 mi^2.

Previous Investigations

The geology and ground-water resources of the Farrington aquifer in the northern part of the Coastal Plain of New Jersey have been studied for many years. Barksdale (1937) discussed the geology and hydrology of the Farrington Sand in Middlesex County. Barksdale and others (1943) completed an investigation of the ground-water resources of Middlesex County, with special emphasis on the coastal plain. Appel (1962) reported on saltwater encroachment into the Farrington and Old Bridge aquifers in the Sayreville area, Middlesex County. Hasan, Kasabach, and Malone (1969) discussed the Old Bridge aquifer in the Sayreville area of Middlesex County. Reports on the ground-water resources of several counties in the northern part of the New Jersey Coastal Plain include: Jablonski (1968) on Monmouth County, Anderson and Appel (1969) on Ocean County, and Vecchioli and Palmer (1962) and Widmer (1965) on Mercer County. Wilson and others (1972) reported on the water resources of the Upper Millstone River basin, with emphasis on the water-table aquifer. The Potomac-Raritan-Magothy aquifer system in the New Jersey Coastal Plain was described by Gill and Farlekas (1976).

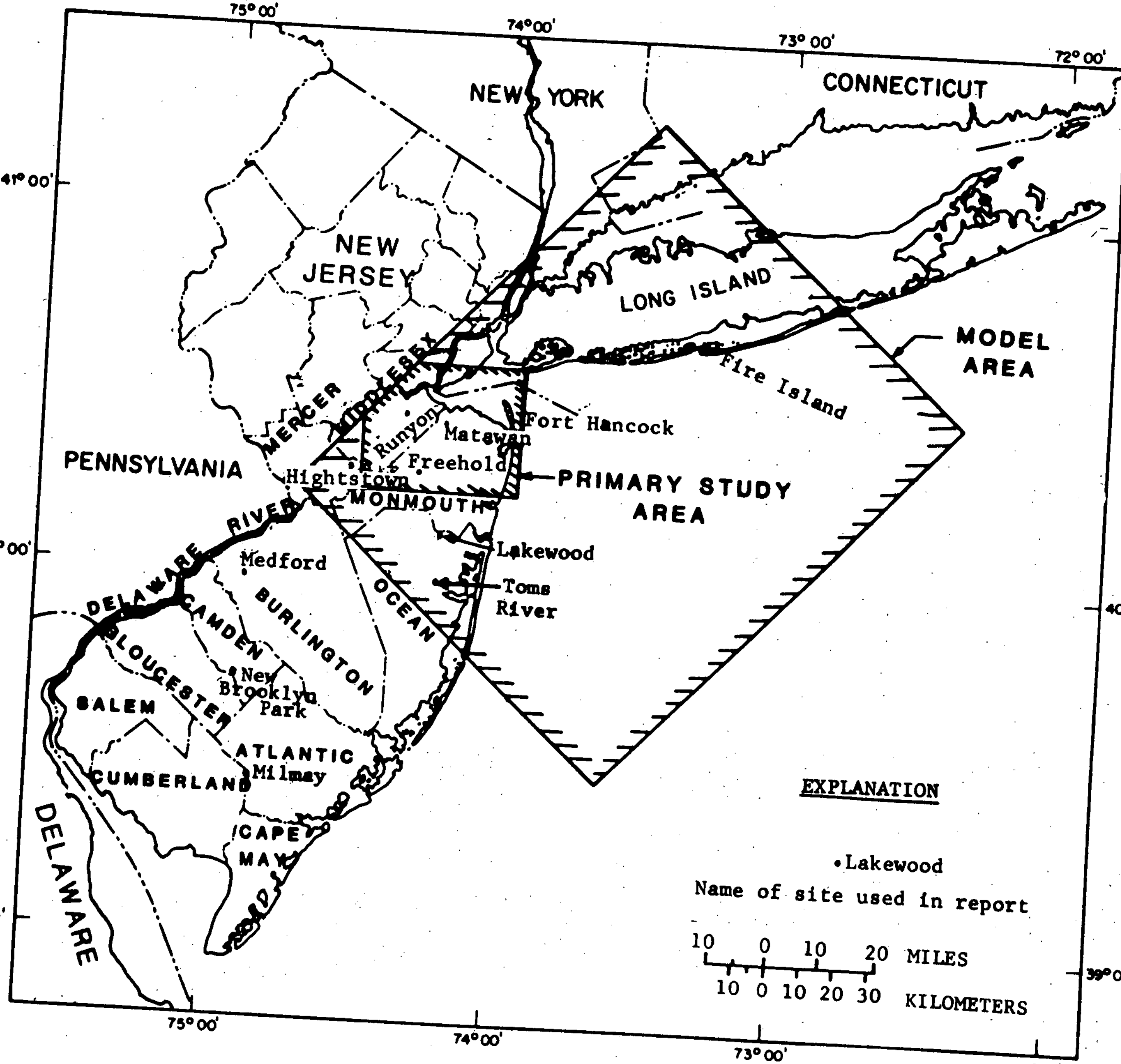


Figure 1.--Map showing area of investigation.

Recent investigations of the geology of the northern part of the Coastal Plain of New Jersey include a report by Owens, Minard, and Sohl (1968) on the Cretaceous deltas and a report by Owens and Sohl (1969) on the Cretaceous-Tertiary shelf and deltaic paleoenvironments. A recent paper by Perry and others (1975) presents a survey of the stratigraphy of the Atlantic Coastal Margin and includes detailed stratigraphic sections of the northern part of the New Jersey Coastal Plain.

Acknowledgments

The assistance of state government officials and private individuals is gratefully acknowledged for furnishing well information and permitting access to wells. Special thanks are extended to the Duhernal Water System officials for providing hydrologic data from their files. Gerard P. Lennon and Flavian Stellerine, both formerly of the U.S. Geological Survey, provided valuable assistance with computer programming.

GEOHYDROLOGY

Potomac-Raritan-Magothy Aquifer System

The northern part of the Atlantic Coastal Plain of New Jersey is underlain by unconsolidated silt, clay, sand, and gravel deposited under fluvial, fluvial-deltaic, and marine conditions. The sediments range in age from Early Cretaceous to Holocene and lie unconformably on a pre-Cretaceous bedrock consisting mainly of sedimentary and igneous rocks of Triassic age and older crystalline rocks. The unconsolidated sediments crop out in northeast-southwest directions and thicken downdip to the southeast. Their thickness ranges from a featheredge in Middlesex County to about 1,700 ft in Monmouth County (Gill and Farlekas, 1976). The present study is concerned with the lower part of this sedimentary sequence.

The most productive source of ground water in the northern part of the New Jersey Coastal Plain is the Potomac-Raritan-Magothy aquifer system, which is made up of the Potomac Group and the Raritan and Magothy Formations of Cretaceous age. This wedge-shaped aquifer system, consisting of quartz sand with some gravel, silt, and clay, thickens from a featheredge at its outcrop in Middlesex County to a maximum of about 600 ft in Monmouth County (Gill and Farlekas, 1976). Overlying the Potomac-Raritan-Magothy aquifer system is a confining unit consisting of the Cretaceous Merchantville Formation and the Woodbury Clay. It is the most extensive confining unit in the New Jersey Coastal Plain and ranges in thickness from a featheredge in Middlesex County to a maximum of approximately 300 ft in Monmouth County. Structure contour maps of the top of the Merchantville Formation, the Magothy Formation, and the pre-Cretaceous bedrock in New Jersey appear in Gill and Farlekas (1976).

The Potomac-Raritan-Magothy aquifer system in the northern part of the New Jersey Coastal Plain contains two major aquifers; the Farrington aquifer, consisting mainly of the Farrington Sand Member of the Raritan Formation, and the Old Bridge aquifer, consisting mainly of the Old Bridge Sand Member of the Magothy Formation. The Old Bridge Sand Member was originally placed in the upper part of the Raritan Formation. However, Wolfe and Pakiser (1971, p. 41) designated the unit as the basal member of the younger Magothy Formation. An analysis of geophysical and water-level data indicate that the Farrington and the Old Bridge function as separate aquifers in Middlesex County, and each can be traced downdip into Monmouth County.

The Woodbridge Clay Member of the Raritan Formation, an extensive confining unit that separates the Farrington Sand Member from the overlying Old Bridge Sand Member, can also be traced downdip from the outcrop area in Raritan Bay to the shore area in Monmouth County. This interpretation is supported by a recently published cross section along the Atlantic Coast (Perry and others, 1975, p. 1542). The stratigraphic section shown in Table 1 is modified from Perry and others (1975, p. 1539) and shows the correlation of part of the Cretaceous section in the northern part of the Coastal Plain of New Jersey (Middlesex and Monmouth Counties) with sediments on Long Island.

SERIES	STAGE	MIDDLESEX COUNTY NEW JERSEY	MONMOUTH COUNTY NEW JERSEY	LONG ISLAND NEW YORK
UPPER CRETACEOUS	LOWER CAMPANIAN	WOODBURY CLAY MERCHANTVILLE FORMATION	WOODBURY CLAY MERCHANTVILLE FORMATION	MATAWAN GROUP (UNDIVIDED)
	SANTONIAN	MAGOTHY FORMATION: CLIFFWOOD BEDS MORGAN BEDS AMBOY STONEWARE CLAY MEMBER OLD BRIDGE SAND MEMBER	MAGOTHY FORMATION: CLIFFWOOD BEDS MORGAN BEDS AMBOY STONEWARE CLAY MEMBER OLD BRIDGE SAND MEMBER	MAGOTHY FORMATION
	CONIACIAN ? TURONIAN			
	? CENOMANIAN	RARITAN FORMATION: SOUTH AMBOY FIRE CLAY SAYREVILLE SAND MBR. WOODBRIDGE CLAY MBR. FARRINGTON SAND MBR. RARITAN FIRE CLAY	RARITAN FORMATION: SOUTH AMBOY FIRE CLAY SAYREVILLE SAND MEMBER WOODBRIDGE CLAY MEMBER FARRINGTON SAND MBR. RARITAN FIRE CLAY POTOMAC GROUP	RARITAN FORMATION

Table 1.--Correlation of stratigraphic units in Middlesex and Monmouth Counties, New Jersey and Long Island, New York (Modified from Perry and others, 1975).

(8)

Lower Confining Unit

The lower confining unit in Middlesex County, as defined in this report, consists mainly of a layer of clay and the underlying consolidated rocks. Southeast of the Monmouth-Middlesex County line, the lower confining unit is defined as the first layer of clay thicker than 20 ft beneath the Farrington aquifer.

In Middlesex County, the upper part of the lower confining unit is the Raritan fire clay (Barksdale and others, 1943). This clay lies between the Farrington Sand Member and bedrock in much of Middlesex County. Near the Farrington outcrop, the Raritan fire clay ranges in thickness from 0 to 35 ft, and the thickness increases downdip (Barksdale and others, 1943, p. 140). Well data near Spotswood, Old Bridge, Runyon, Parlin, and South Amboy indicate a thickness of up to 86 ft for the Raritan fire clay.

The lower part of the confining unit in Middlesex County consists of rocks of Triassic age and pre-Triassic crystalline rocks. An analysis of drillers' logs indicates that Triassic rocks extend beneath the northwestern edge of the coastal plain southward for approximately 5 mi. Farther southeast, the bedrock is composed of pre-Triassic crystalline rocks. The thickness of the Triassic and crystalline rocks is not known.

Within the Triassic sequence is a thick diabase sill, which is exposed north of the study area along the Hudson River, where it forms the Palisades. The same diabase sill occurs on Staten Island, N.Y., in Middlesex County, N.J., and farther west. The sill is a continuous unit within the study area and is overlain by post-Triassic sediments (Barksdale and others, 1943, p. 15). The hydrologic significance of this sill will be discussed in the section on aquifer characteristics.

The lower confining unit southeast of the Middlesex-Monmouth County line is defined as the first confining layer of clay below the Farrington aquifer thicker than 20 ft. Only a few wells or test holes completely penetrate the Farrington in this area. Consequently, data on the sediments between the Farrington and bedrock are scant. Geophysical logs of a test hole just north of Freehold Borough suggest the presence of at least 60 ft of silt and clay below the principal aquifer. Southeast of the Middlesex-Monmouth County line, geophysical logs indicate a thickness of up to 200 ft for the lower confining unit.

Farrington Aquifer

Geohydrology

The Farrington aquifer in the northern Coastal Plain of New Jersey consists primarily of the Farrington Sand Member of the Raritan Formation. At or near its outcrop, the aquifer includes the Farrington Sand Member and overlying sand and gravel beds. In Middlesex County southeast of the outcrop, the aquifer consists solely of the Farrington Sand Member. Southeast of the Middlesex-Monmouth County line, the aquifer, as defined in this report, consists of the Farrington Sand and the underlying uppermost sand layers of the Potomac Group, which are hydraulically connected to the Farrington.

In Middlesex County, the Farrington Sand Member has been described as coarse to fine sand with lignite and pyrite. Locally, it contains clay beds (Barksdale and others, 1943, p. 104-105). In Middlesex County, its thickness ranges from 0 to 129 ft. Near South River, Sayreville, and Old Bridge the thickness of the Farrington ranges from 44 to 104 ft. It is either thin or missing above the Triassic diabase sill between the Borough of South River and Perth Amboy City due to erosion or a lack of deposition during Cretaceous time (Barksdale and others, 1943, p. 106). The sand was deposited in a subaerial deltaic environment near the outcrop area and in a marine environment downdip along the coast (Perry and others, 1975, p. 1543). North of the Raritan River, the northwesterly part of the Farrington Sand Member in Middlesex County is overlain by a unit consisting of sand and, in places, clayey sediments (Barksdale and others, 1943, p. 19 and p. 58). Farther north in Middlesex County, the northwesterly part of the Farrington is overlain by glacial deposits of considerable thickness (Barksdale, 1937, p. 6). Information on the Farrington at the New Jersey-New York State line beneath Arthur Kill is not available. On Staten Island, the northwesterly part of the Farrington is overlain by glacial deposits consisting of ground moraine and terminal moraine and some glacial outwash (Perlmutter and Arrow, 1953, plate 2).

Near the Raritan River, the Farrington Sand Member is overlain by Pleistocene or Holocene deposits consisting of highly permeable sand and gravel. In some places, the overlying deposits are dense and nearly impermeable. In places, the ancestral Raritan River eroded through the Farrington, disrupting its continuity. The Farrington has been replaced with relatively impermeable river mud. This mud, where present, restricts the hydraulic connection between the part of the Farrington north of the Raritan River with the part south of the river (Barksdale, 1937, p. 3-6).

Along the Washington Canal, the overlying confining unit (Woodbridge Clay Member), together with all or part of the Farrington Sand Member, has been eroded. Here, Holocene sand and gravel were deposited directly on the Farrington and the Triassic bedrock, thus increasing the thickness of the aquifer (Barksdale, 1937, p. 6-9).

South of the Raritan River, the northwesterly part of the Raritan and Magothy Formations are covered by surficial deposits of fine to very coarse sand and local basal beds of gravel (Owens and Minard, 1975). Near Hightstown, the surficial deposits reach a thickness of 94 ft. Where the surficial deposits are in direct contact with the underlying Farrington Sand Member, the thickness and effective recharge area of the Farrington is increased. Wilson and others (1972, p. 27) state that west of the New Jersey Turnpike in the Upper Millstone River basin, where the surficial deposits overlie Cretaceous sediments, the entire section acts essentially as a single water-table aquifer.

Southeast of the Middlesex-Monmouth County line, few wells penetrate the Farrington Sand Member and, consequently, data are sparse. However, geophysical data at Lakewood, Freehold, Toms River, and Sandy Hook, and palynological analyses of cores from wells at Fort Dix, Matawan, Sandy Hook, and Toms River (Perry and others, 1975, p. 1542; Sirkin, written commun., 1971) indicate that the Farrington is separated from the underlying sands of the Potomac Group by a relatively thin confining unit. The unit may be equivalent to the Raritan fire clay. At Sandy Hook and Toms River, this confining unit is only 10 to 20 ft thick (Perry and others, 1975, p. 1542). The thinness of this confining unit strongly suggests that the Farrington and some Potomac sands act as a single aquifer in Monmouth and Ocean Counties in the study area. For this reason, in the area southeast of the Middlesex-Monmouth County line, the Farrington aquifer, as defined in this report, includes the uppermost Potomac sand unit.

The top of the Farrington aquifer strikes in a northeast-southwest direction and dips to the southeast 45 to 60 ft/mi. A structure contour map of the top of the aquifer constructed primarily from geophysical logs is shown in figure 2. The altitude of the top of the aquifer near the Middlesex-Monmouth County line is approximately 400 ft below mean sea level. Near Freehold, the top is approximately 700 ft below mean sea level.

A thickness map of the Farrington aquifer, constructed from geophysical logs and geologists' and drillers' logs, is shown in figure 3. More than 50 geophysical logs were used, most of which were obtained from wells within 6 mi of the outcrop area. The aquifer, is thickest, about 170 ft, in Marlboro Township, Monmouth County (fig. 3).

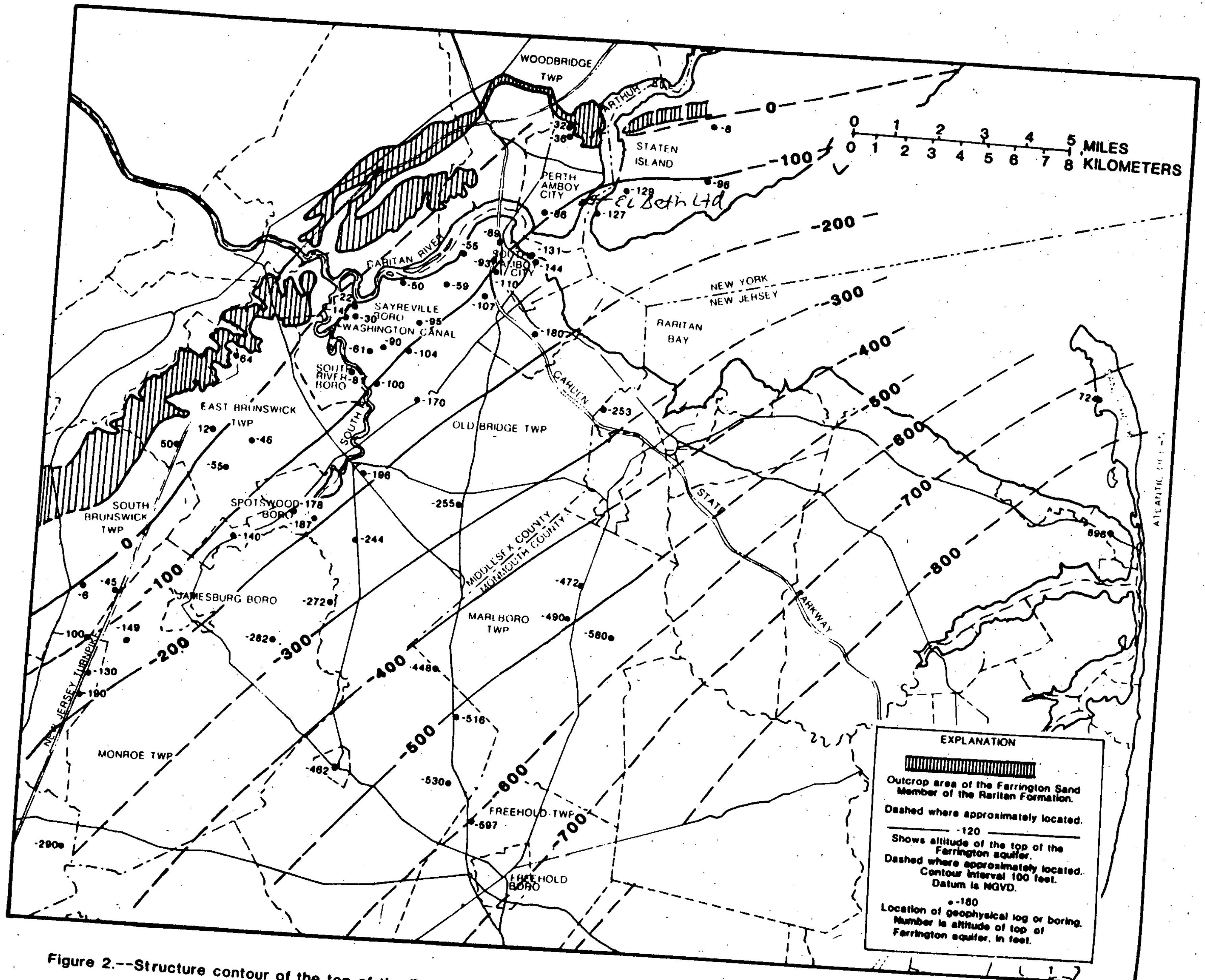


Figure 2.--Structure contour of the top of the Farrington aquifer.

(62)

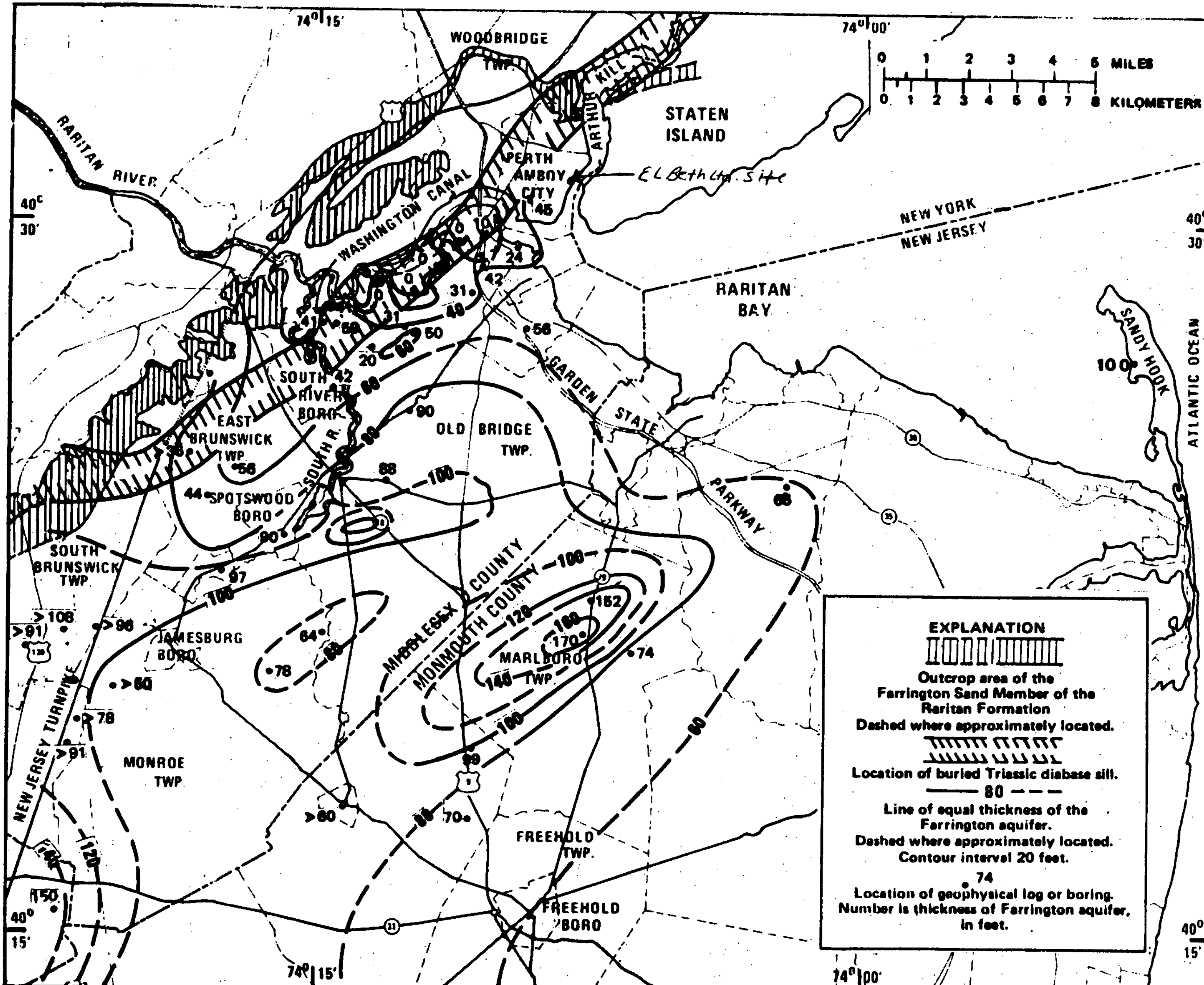


Figure 3.--Thickness of the Farrington aquifer.

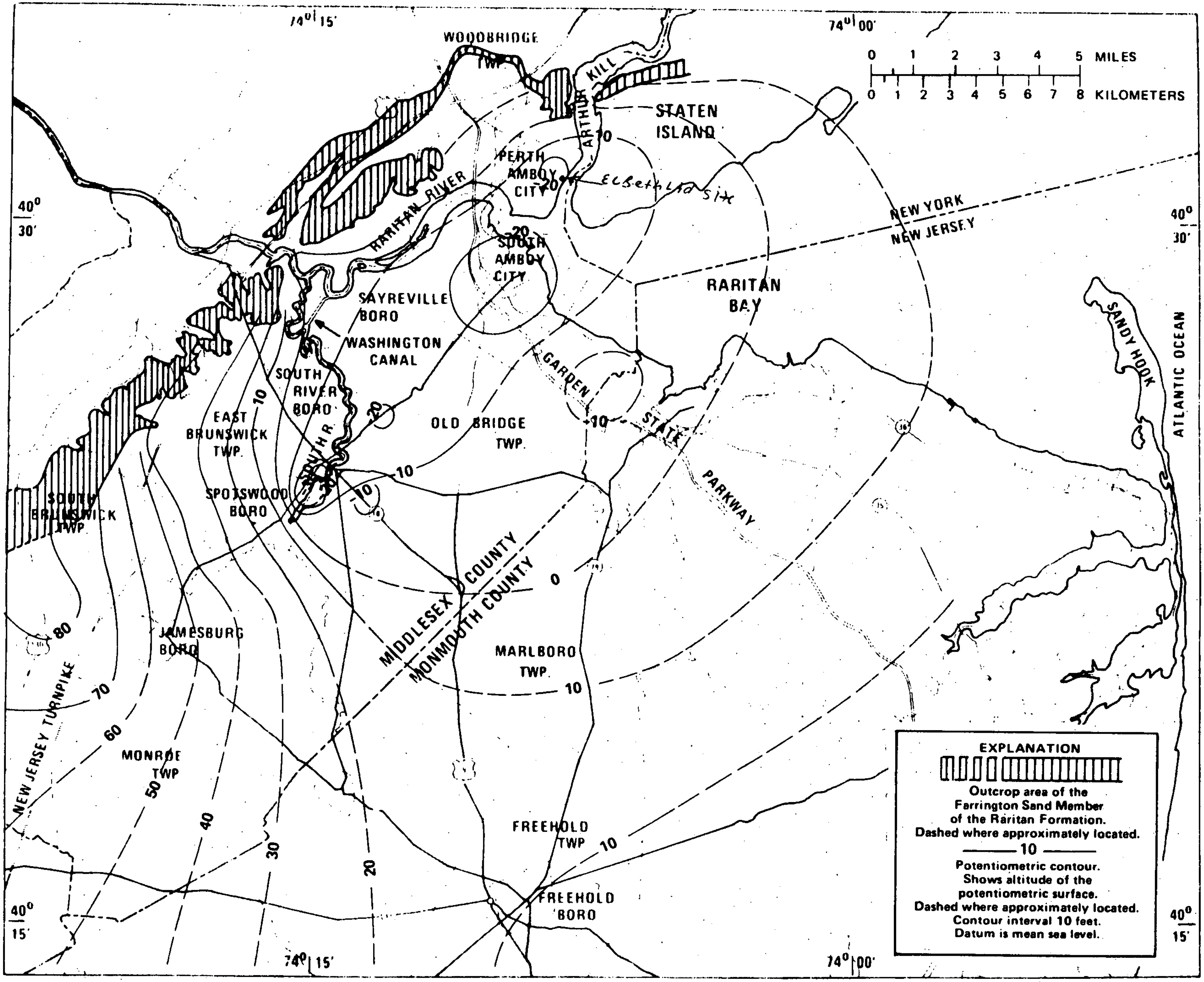


Figure 5. Generalized potentiometric surface of the Farrington aquifer, 1959.

a discharge to a recharge area prior to 1959. Ground-water flow in 1959 was from the canal to Perth Amboy's Runyon well field (fig. 5).

Water-level measurements made in November 1973 at more than 180 wells were used to construct a 1973 potentiometric surface for the Farrington aquifer. The map (fig. 6) shows a deeper and more extensive cone of depression with the lowest point in excess of 70 ft below mean sea level in the Sayreville area. The gradient from the Washington Canal to Perth Amboy's Runyon well field increased 10 ft/mi between 1959 and November 1973. Water levels in the major recharge area of South Brunswick Township area did not change significantly from 1959 to November 1973.

Withdrawals

Withdrawals from the Farrington aquifer south of the Raritan River began at Perth Amboy's Runyon well field in 1897. By 1914 total withdrawals from the Farrington aquifer in Middlesex County "did not exceed one or two million gallons daily" (Barksdale and others, 1943, p. 107). Annual withdrawal data presented by Barksdale and others (1943, p. 108) for the period 1929-42 are shown in figure 7 together with withdrawals for the period 1959-73. The peak withdrawal of 12 Mgal/d (18 ft^3/s) for the period of 1929-42 occurred in 1936. The lowest withdrawal rate of 7 Mgal/d (11 ft^3/s) for the period occurred in 1942.

Ground-water withdrawals from the Farrington aquifer for the period 1959-73 are presented in figure 8. The total withdrawal shown includes irrigation, public supply, and industrial use. Irrigation withdrawals did not exceed 0.3 Mgal/d (0.5 ft^3/s) and, therefore, are not shown in figure 8. Total withdrawal increased 113 percent, from 12.1 Mgal/d (18.7 ft^3/s) in 1959 to 25.8 Mgal/d (1.4 ft^3/s) in 1973. Public supply and industrial withdrawals during the period 1959-65 were approximately equal and each increased at an average annual rate of 0.2 Mgal/d (0.3 ft^3/s). However, during the period 1966-73, yearly industrial withdrawals were virtually unchanged; while, public-supply withdrawals increased from 9.0 Mgal/d (13.9 ft^3/s) to 18.4 Mgal/d (28.5 ft^3/s), an average annual rate of increase of 1.2 Mgal/d (1.9 ft^3/s). Much of the increase in public-supply withdrawals from 1966 to 1973 occurred southeast of the Old Bridge-Sayreville area.

Upper Confining Unit

The upper confining unit for the Farrington aquifer as defined in this report consists mainly of the Woodbridge Clay Member of the Raritan Formation. The upper confining unit also includes the clayey segment of the overlying Sayreville Sand Member and the South Amboy Fire Clay Member, both of the Raritan Formation, when these units are in direct contact with the Woodbridge. This confining unit is quite extensive and has been traced into Monmouth County on the basis of geophysical logs and palynological data. A thickness map of the confining unit, based

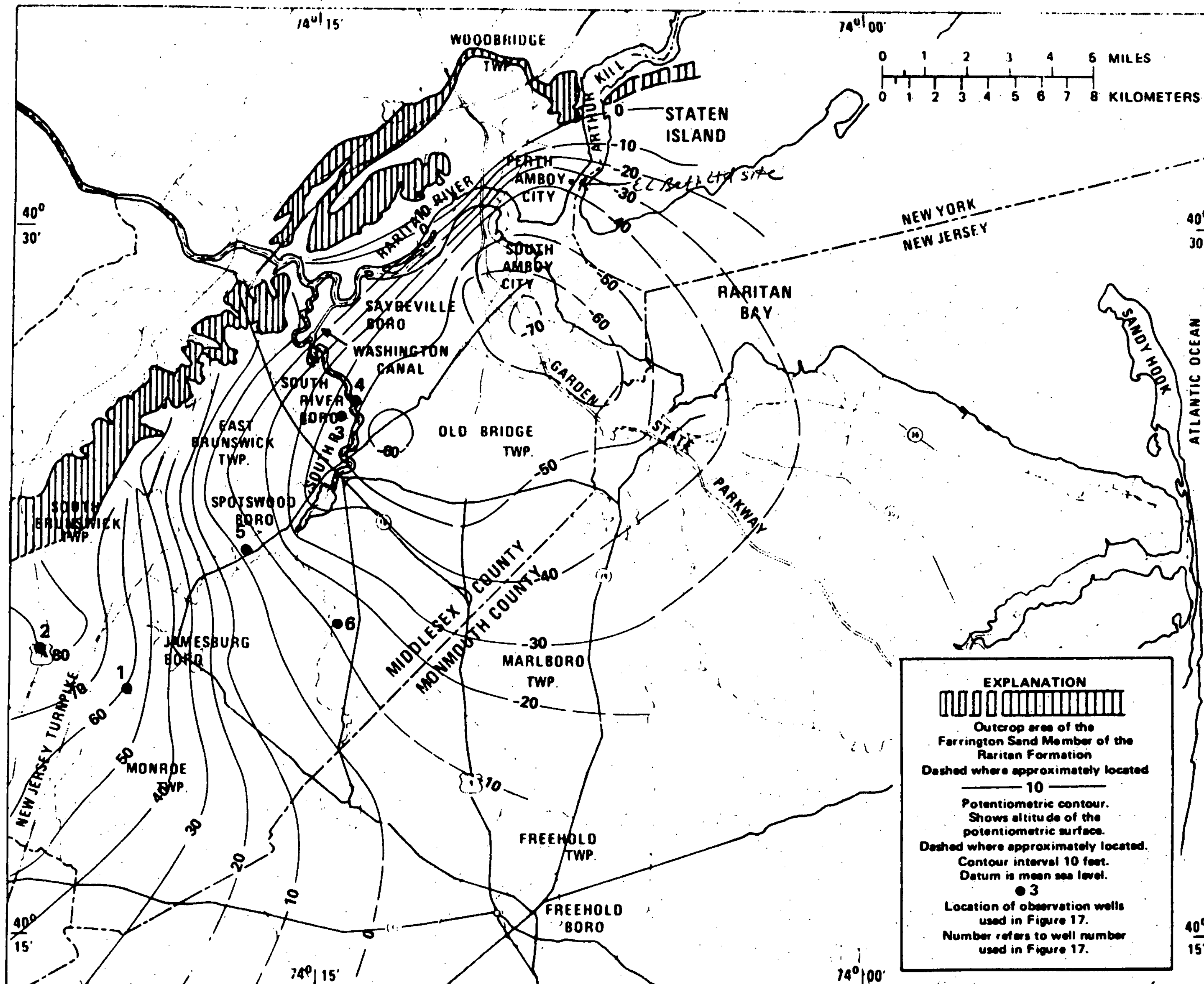


Figure 6. Potentiometric surface of the Farrington aquifer, November 1973.

(111)

on geophysical and drillers' logs, is shown in figure 9. Although variable in thickness, the unit is generally greater than 100 ft thick southeast of the outcrop of the Old Bridge Sand Member. The unit has a maximum thickness of 244 ft.

The Woodbridge Clay Member is a thin to thick-bedded sequence of micaceous silts and clays (Owens and Sohl, 1969, p. 239). The basal part of the Woodbridge "contains beds of compact, tough, and highly refractory fire-clay" (Barksdale and others, 1943, p. 103). This fire-clay has been mined in the vicinity of Sayreville. Also, near Sayreville, the Woodbridge contains lignite, pyrite, and nodular masses of impure siderite (Barksdale and others, 1943, p. 103). To the southwest, the clay content in the Woodbridge decreases, while the sand and gravel content increases. The hydrological significance of this change in lithology will be discussed in a later section of this report.

The Woodbridge ranges in thickness from 50 to 90 ft near the outcrop area (Barksdale and others, 1943, p. 103). Farther downdip, the thickness is 190 ft at Fort Hancock and 120 ft at Toms River (Perry and others, 1975, p. 1542). Perry and others (1975, p. 1543) state that the Woodbridge is "probably estuarine to shallow water marine in origin." Siderite nodules found near Sayreville in the upper part of the Woodbridge contained marine fossils suggesting a marine depositional environment for at least part of Raritan time (Barksdale and others, 1943, p. 103). Dinosaur footprints have also been found in the upper part of the Woodbridge (Barksdale and others, 1943, p. 103-104).

The Woodbridge Clay Member is widespread throughout the Raritan Bay area (Owens and Sohl, 1969, p. 239) and has been traced from Long Island to southern New Jersey on the basis of recent palynological studies. Pollen characterizing the Woodbridge has been found in clays cropping out along the North Shore of Long Island (Sirkin, 1974, p. 440) and in clay pits near Sayreville in Middlesex County (Wolfe and Pakiser, 1971, p. B38-39). Core samples obtained from well sites at Matawan, Monmouth County, and at Fort Dix and Medford, Burlington County, have yielded this same pollen zonation (Sirkin, written commun., 1971). These sites are located 10-15 mi downdip from the outcrop area. Farther downdip, the same zonation has been found in cores collected at Fire Island State Park, Long Island; Fort Hancock, Monmouth County; and Toms River, Ocean County (Perry and others, 1975, p. 1540) as well as from cores obtained at New Brooklyn Park, Camden County, and at Milmay, Cumberland County (Sirkin, written commun., 1971).

Overlying the Woodbridge Clay Member at some locations is the Sayreville Sand Member of the Raritan Formation. The sand consists of fine to medium sand with an average thickness of 35-40 ft (Barksdale and others, 1943, p. 101-102). Locally, it is thin and clayey. Because of its irregular occurrence and its clay content, the Sayreville sand is not a significant water-producing unit.

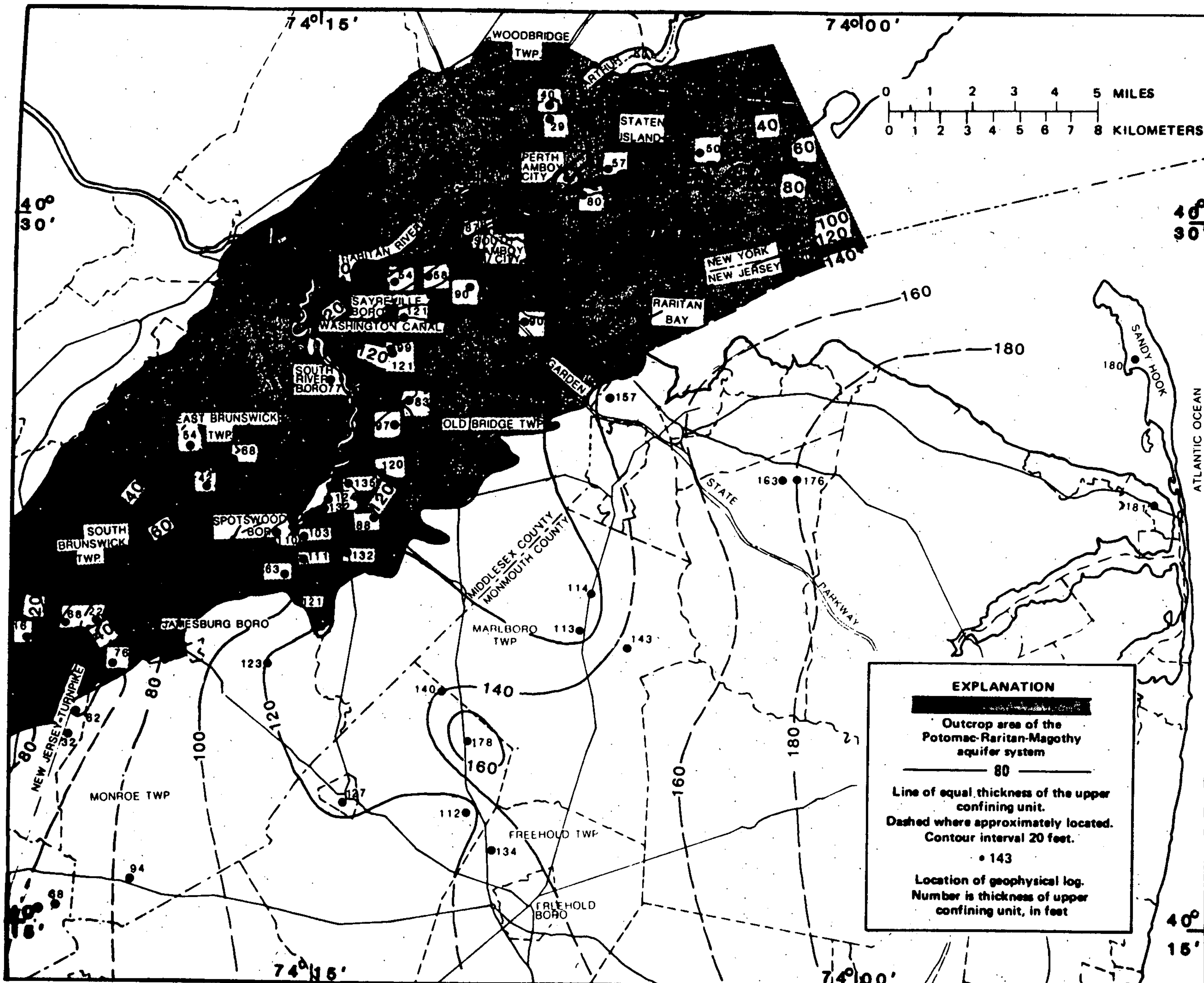


Figure 9.--Thickness of the upper confining unit.

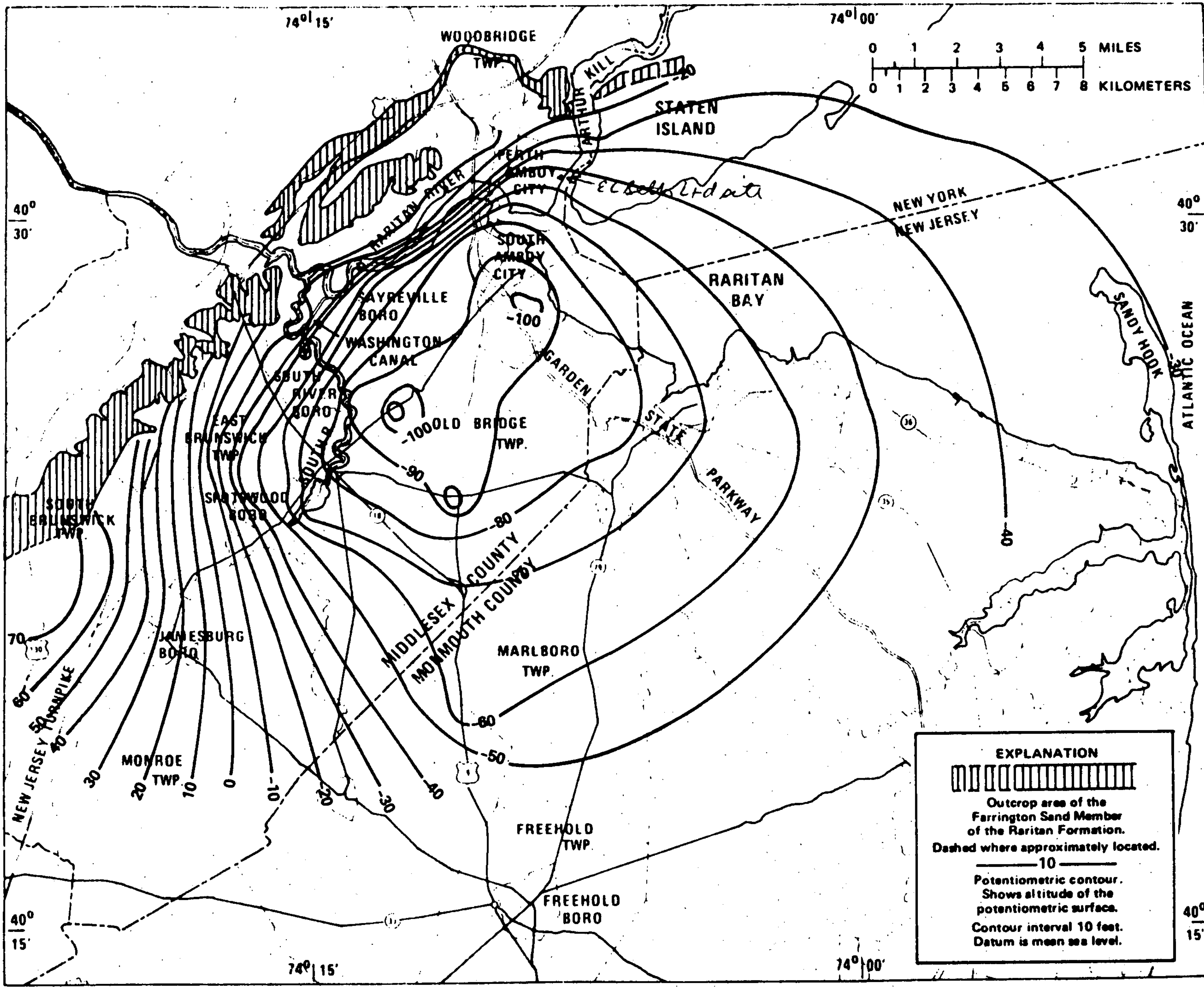


Figure 20. Simulated potentiometric surface of the Farrington aquifer, 1985.

($4.3\ ft^3/s$), infiltration from surface-water bodies ($2.6\ ft^3/s$, and water released from storage ($3.4\ ft^3/s$). All of these occurred within the subarea.

Discharge from the subarea for the last time step of 1973 was largely by withdrawals through wells. The total withdrawal rate through wells was $26.5\ ft^3/s$. Combined discharge through vertical leakage to the Old Bridge and to surface-water bodies was approximately $3.2\ ft^3/s$. The difference between inflow, water released from storage, and outflow is $0.3\ ft^3/s$, about 1 percent of outflow, which is probably due to calculation errors inherent in the computer.

A budget analysis of the subarea under transient conditions for the year 2000 produced a similar percentage of inflows and discharges. However, the values were greater than those calculated for 1973.

SUMMARY AND CONCLUSIONS

The Potomac-Raritan-Magothy aquifer system consisting of sand, silt, clay, and gravel of Cretaceous age is the most productive source of ground water in the northern part of the New Jersey Coastal Plain. The Farrington and the Old Bridge aquifers are the two major aquifers within the Potomac-Raritan-Magothy system in Middlesex and Monmouth Counties.

The Farrington aquifer consists primarily of the Farrington Sand Member of the Raritan Formation and overlying surficial deposits in Middlesex County. In Monmouth County, the aquifer consists of the underlying sand unit of the Potomac Group. The aquifer ranges in thickness from a featheredge at its outcrop to more than 170 ft in Marlboro Township, Monmouth County. The mean specific capacity of 99 wells, mostly in Middlesex County, is 20.4 (gal/min)/ft of drawdown. The mean specific capacity per ft of well screen is 0.62 (gal/min)/ft per foot of screen.

Overlying the Farrington Sand Member is a confining unit of silt and clay composed mainly of the Woodbridge Clay Member of the Raritan Formation. The confining unit has a maximum thickness of 244 ft and separates the overlying Old Bridge aquifer from the Farrington aquifer.

A major cone of depression existed in the Farrington aquifer near Sayreville in 1959 and 1973. Cones of depression for the Old Bridge aquifer occurred in the Keyport area in 1959 and 1973 and in the Freehold area in 1973. Withdrawals from wells tapping the Farrington aquifer increased from 12.1 Mgal/d ($18.7\ ft^3/s$) in 1959 to 25.8 Mgal/d ($39.9\ ft^3/s$) in 1973. The major recharge area for both the Farrington aquifer and the Old Bridge aquifer is in South Brunswick Township in Middlesex County.

A finite-difference digital-flow model was developed to simulate water-table and artesian conditions in the Farrington aquifer. A lateral hydraulic conductivity of 105 ft/d was used for most of the area. A uniform storage coefficient of 1.6×10^{-4} was used for artesian conditions and a uniform specific yield of 0.25 for water-table conditions. Vertical hydraulic conductivity of the upper confining unit ranged from 4.2×10^{-7} to 1.0×10^{-10} ft/s and a specific storage of 4×10^{-5} ft^{-1} was used. The model includes the effects of declining water levels in the Old Bridge aquifer. For transient conditions, the 1959 Farrington potentiometric surface was used as the starting head and the 1959 Old Bridge potentiometric surface was used as the initial head overlying the confining unit. Old Bridge heads were adjusted at each node and at every time step using the average rate of change in head for each node between 1959 and 1973.

The model was calibrated for the 15-year period, 1959-73. Yearly withdrawal rates were used to stress the aquifer. Calibration of the model was achieved by comparing the calculated potentiometric surface for the end of the 15-year period with the observed November 1973 potentiometric surface. In addition, hydrographs of selected wells were compared with model results. After calibration, steady-state conditions were simulated. The model results compared favorably with available prepumping water levels.

The potentiometric surface of the Farrington aquifer was simulated to the year 2000 by using projected withdrawals. The withdrawals were estimated by a linear projection determined from 1959-73 withdrawals. The simulated potentiometric surface for the Sayreville area is in excess of 100 ft below mean sea level by 1985 and exceeds 150 ft by 2000. The simulated potentiometric surfaces for 1985 and 2000 are somewhat similar to the 1973 surface, but the cone of depression in the vicinity of Sayreville is greater in depth and area.

A ground-water budget analysis for steady-state conditions prior to development indicates that total inflow into the Farrington aquifer was 16 ft^3/s. Recharge in the outcrop area and vertical leakage from the Old Bridge each accounted for about 8 ft^3/s each. Approximately 75 percent of the discharge occurred in or near the outcrop area. Most of this discharge was into the Raritan River, Washington Canal area, and Arthur Kill. The remaining 25 percent of the discharge occurred southeast of the outcrop as vertical leakage into the overlying Old Bridge aquifer and as lateral flow into Ocean and Burlington Counties.

The budget analysis for transient conditions (1959-2000) indicates the importance of vertical leakage (mainly from the Old Bridge) as a source of water to the Farrington aquifer. Other sources of water include recharge in the outcrop area, water released from storage, and infiltration from the Washington Canal and part of the Raritan River. The original hydraulic gradient toward the two surface-water bodies was reversed prior to 1959, thus causing the Washington Canal and part of the Raritan River to recharge the aquifer. The budget analysis also shows that

(2) ~~20~~

recharge into the aquifer from these two surface-water bodies increased with time during the simulation.

A transient budget analysis for the last time step of 1973 was made for a subarea consisting mainly of Middlesex County. About 48 percent (14.3 ft^3/s) of the total inflow to the subarea was through its boundaries. Other sources included direct recharge (5.4 ft^3/s), vertical leakage, mainly from the Old Bridge, (2.6 ft^3/s), and water released from storage (3.4 ft^3/s). Withdrawals from wells (26.5 ft^3/s) were the major discharge from the subarea of the aquifer. The combined rate of discharge through vertical leakage to the Old Bridge and to surface-water bodies was approximately 3.2 ft^3/s.

Analysis for the year 2000 showed a similar percentage. However, the values were greater than those calculated for 1973.

REFERENCE NO. 11

Werdin

Trube

STATE OF NEW JERSEY

STATE WATER POLICY COMMISSION

SPECIAL REPORT 8

THE GROUND-WATER SUPPLIES OF MIDDLESEX COUNTY, NEW JERSEY

Prepared in cooperation with the United States Department of the Interior, Geological Survey

1943

State of New Jersey
State Water Policy Commission
Howard T. Critchlow, Engineer in Charge

The Ground-Water Supplies of Middlesex County New Jersey

With Special Reference to the Part of the Coastal Plain Northeast of Jamesburg

By

Henry C. Barksdale

Meredith E. Johnson
Roger C. Baker
Edward J. Schaefer
George D. DeBuchananne

Prepared in cooperation with the
United States Department of the Interior,
Geological Survey

(2

New Jersey State Water Policy Commission

28 West State Street, Trenton, N. J.

CONTENTS

PAGE

TABLES

ILLUSTRATIONS

(4)

LETTER OF TRANSMITTAL

Mr. George S. Burgess, Chairman
State Water Policy Commission

DEAR SIR:

I am transmitting herewith a report on ground-water supplies of Middlesex County, N. J., prepared by Henry C. Barksdale, Hydraulic Engineer, U. S. Geological Survey. The report contains the information which has been assembled on ground-water conditions in that portion of Middlesex County adjacent to Raritan Bay and extending up the valleys of Lawrence Brook and South River. It discusses the public water supplies and many of the private supplies which are derived from the ground-water horizons designated in the report as Farrington (No. 1) sand and Old Bridge (No. 3) sand. Special Report No. 7 published in 1937 was a preliminary report on the water supplies from the No. 1 sand in the vicinity of Parlin.

The report points out the danger to the water supplies in this area from salt water intrusion and emphasizes the importance of reducing the draft on the No. 1 sand in order to avoid further pollution. It warns against further development in the No. 3 sand, the safe yield of which has been reached in this area. It is important that the municipalities and other public agencies be acquainted with this situation in order that the valuable ground water resources in this area may not be ruined by overdraft.

I therefore recommend that this report on ground-water supplies of Middlesex County be published as a special report of the Commission in order that the information contained therein may be made available to the people of the State.

Respectfully submitted,

H. T. CRITCHLOW,
Engineer in Charge.

June 11, 1943.

5

ABSTRACT

Ground-water investigations have been carried on in parts of Middlesex County since 1923. This report is based upon detailed observations of ground-water conditions in that part of the coastal plain between Jamesburg and Perth Amboy, and upon a generalized survey of ground-water conditions in the remainder of the county. It deals primarily with the factors affecting the safe yield of the more important aquifers in the county.

Roughly the northwestern third of the county is underlain by rocks of the Newark group of Triassic age and the southeastern two-thirds by sands and clays of the coastal plain, which are of Cretaceous age and are largely unconsolidated. The rocks of the Newark group dip toward the northwest, but they are so badly fractured that the dip is of very little significance from a hydrologic standpoint. Intruded into the rocks of the Newark group is a diabase dike, that is of no importance as a water-bearing formation, but stood as a ridge on the surface upon which the Cretaceous deposits were laid down. Hence the lowest of the Cretaceous sands (the Farrington sand member of the Raritan formation) is almost divided into two parts by it. To a considerable extent this ridge has been effective in retarding the advance of salt water into this sand from the estuary of the Raritan River. The beds of the coastal plain formations dip to the southeast, and alternating layers of permeable sands and relatively impermeable clays provide a setting under which water supplies are frequently encountered under artesian conditions. Both the Cretaceous formations and the older rocks of the Newark group are overlain throughout much of the county by various Quaternary deposits. These latter deposits are relatively unimportant as water-bearing formations. Their principal importance lies in their ability to absorb water and transmit it to the underlying materials, or in a few places to prevent the absorption of water by the underlying bed.

Early developments of ground water in the county were primarily in the form of relatively shallow dug wells, and in the improvement of existing springs. Drilled wells similar to those generally in use today were not developed to any considerable extent until the end of the last century. The development of large supplies of ground water has depended to a considerable extent upon the development of well drilling methods and upon the improvement of well pumping machinery. In 1941 more than 37 million gallons of water a day was pumped from wells for industrial and municipal water supplies in Middlesex County. Of this amount about 22 million gallons a day was used exclusively for industrial purposes and the remainder for public water supplies.

The quality of water obtained from wells in Middlesex County is generally satisfactory for all ordinary purposes. It sometimes requires treatment for the removal of iron or for the reduction of hardness. In some areas the ground waters have been contaminated by sea water that has been drawn into the aquifers by heavy pumping. Where this contamination has been severe, the waters are of little value except for cooling.

16

In the course of these investigations records of water levels have been obtained in a great many wells. Some of these records now cover a period of more than twenty years. Included in this group are some wells not affected by pumping that have been used as a standard for comparison with the fluctuations in the other observation wells. They have also proved valuable as indices of the amount of water naturally stored in the ground at various times. As such they are useful outside the scope of this report for the prediction of minimum stream flow and for similar purposes. At the Perth Amboy Water Works, at Runyon, a record of precipitation, temperature and evaporation has been obtained for approximately 20 years.

Of the various aquifers within the county three are of major importance. The rocks of the Newark group are the principal source of ground water in the northwestern part of the county. The Old Bridge and Farrington sands, both members of the Raritan formation, are the principal sources of water supply in the southeastern two-thirds of the county. The other aquifers are of relatively little importance either because of the limited area in which they are available or because they are not capable of yielding substantial supplies.

The Old Bridge sand is the most important aquifer within the county. It supplies more than half the total water used for industrial and public water supplies. In 1941 a total of more than 19 million gallons a day was withdrawn from this sand in Middlesex County and 2 or 3 million gallons a day was taken from wells tapping this sand outside the county, bringing the total yield to 21 or 22 million gallons daily. In 1942 the total pumpage had increased to 25 or 26 million gallons daily. Studies made of this sand indicate that natural recharge probably could not supply this large yield of water. Fortunately, however, at least two major developments include works for artificially recharging this sand. Even so, it is believed that the safe yield of this sand has been reached. The pumpage from this sand should not be increased except in instances where it is possible and desirable to recharge the sand with surface water in an amount essentially equivalent to the additional water to be taken from wells.

The Farrington sand yielded about 8.5 million gallons daily to municipal and industrial wells during 1941. The safe yield of this sand appears to have been exceeded for a considerable period in the past. Its capacity is limited not by the amount of natural recharge or by its ability to transmit water, but rather by the fact that it is exposed in numerous localities to the intrusion of salt water from surface sources. A considerable part of this sand now contains water that is contaminated by salt water. In at least three areas the water in this sand is severely contaminated. There is substantial evidence supporting the belief that the areas of contamination will expand with continued pumping from the wells tapping this sand. A few wells that drew from this sand have already been abandoned because of salt-water contamination, and it seems probable that a considerable number of others will have to be abandoned at some time in the future. After this has occurred and the total pumpage from the sand has thereby been reduced materially, it may be possible to develop some new water supplies from this sand in areas near its intake area and remote from bodies of surface water containing salt.

The rocks of the Newark group yield water to a large number of wells in the county. In localities where they are covered by permeable material they yield substantial quantities. In areas where they are not covered by such deposits

or where they are covered by impermeable materials, the yield is very low. The water that these rocks yield comes almost entirely from cracks which form a small part of their total volume so that their storage capacity is low. Substantial yields are safely obtained only in areas where the overlying material is capable of absorbing and storing considerable amounts of water and of transmitting it freely to the underlying rock.

It seems probable that no more large ground-water developments can be made within Middlesex County. Possibly some additional water may be obtained from the Newark group, but this should not be attempted without a careful study of conditions in the vicinity of any proposed development, because draft on these rocks is already heavy. Some additional water can be developed from the Englishtown sand in the southeastern corner of the county, but care should be exercised not to injure water supplies derived from this sand down the dip in Monmouth County. On the whole it seems probable that any large additional supplies of water for Middlesex County will have to come from surface water, and very possibly from sources outside the county. The appraisal of sources of surface water is, however, outside the scope of this report.

Future studies of the Old Bridge sand should be directed primarily toward ways of increasing its intake capacity by artificial recharge. Those of the Farrington sand should be concerned primarily with the salt-water instrusion in this sand. Intensive quantitative studies should be made of the Newark group in order to estimate more accurately its safe yield in different localities. Measurements should be continued at the evaporation station at Runyon and in the Morrell and other water-table wells. A few additional observation wells should be established in parts of the county where there is no effect of pumping.

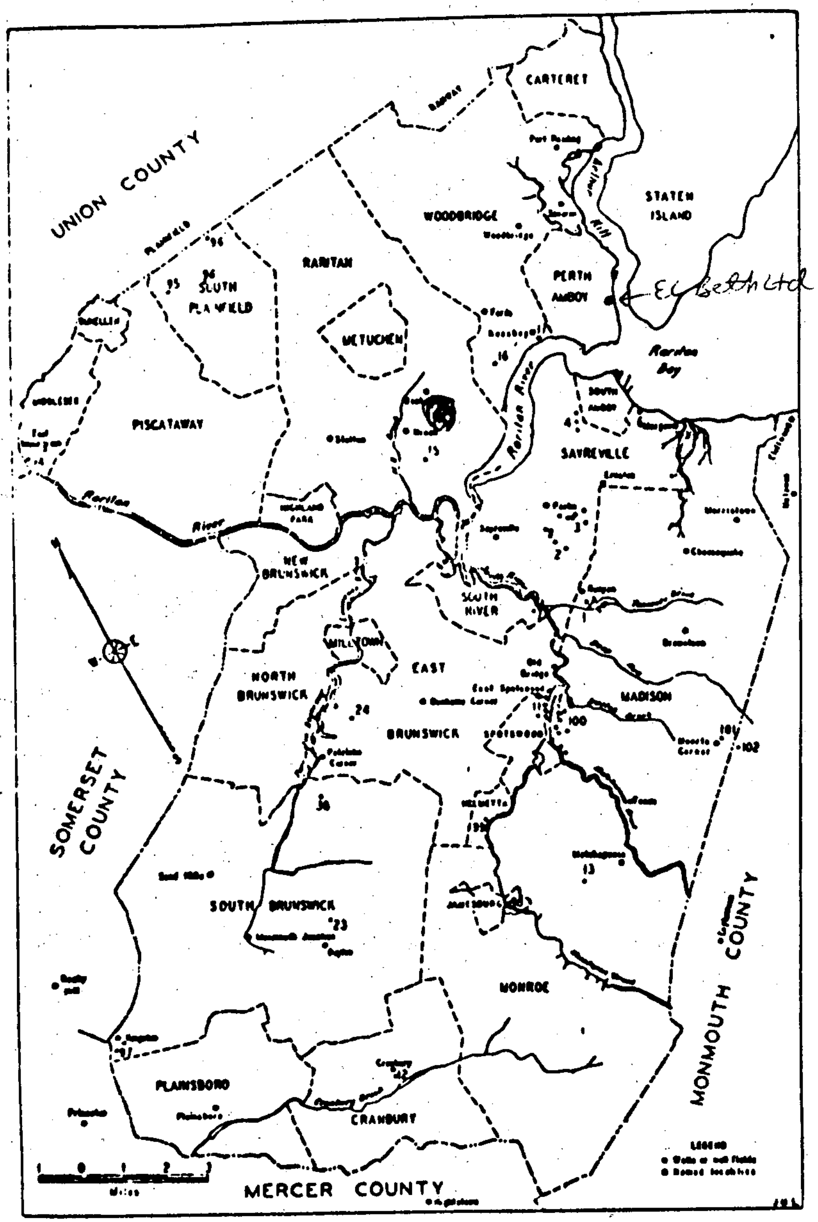


FIGURE 2.—Map of Middlesex County, showing municipal boundaries, the location of important wells or well fields, and places referred to in the text.

KEY TO WELL NUMBERS (Figure 2)

1. Perth Amboy Water Department
2. Hercules Powder Company
3. E. I. duPont deNemours & Co.
4. National Lead Company
6. South Amboy Water Department
7. South River Water Department
11. Peter J. Schweitzer Company
12. Cranbury Water Company
13. State Home for Boys
23. Kufka test well
24. Fischer test well
38. Beecher test well
94. Elizabethtown Water Company, Piscataway well field
95. Plainfield-Union Water Company, Clinton Avenue wells
96. Middlesex Water Company well fields
97. Kingston Water Company
98. Jamesburg Water Company
99. Helmetta Water Company
100. Duhernal water supply
101. Morrell well
102. Hulsart well

Scope of report.—This report is based upon detailed observations of ground-water conditions which were begun at the Perth Amboy Water Works at Runyon in 1923, and have been gradually expanded to cover much of the industrial area along the estuary of the Raritan River, and upon a more generalized survey of ground-water conditions in the remainder of the county which has been carried out mainly during 1941 and 1942. Detailed field studies have been made of the geology and hydrology of the part of the county that lies in the coastal plain northeast of Jamesburg. It is in this area that most of the ground-water development in the county has taken place, and the major part of the report deals with the conditions there. For the remainder of the county, the report is more generalized.

The quality of the ground water of the area is discussed briefly in a section of the report devoted to that topic. Samples of water have been collected from representative wells tapping each of the more important aquifers and have been analyzed for their mineral content in the Water Resources Laboratory of the Geological Survey. The results of these analyses are included in tabular form. No attempt is made to determine the sanitary or bacteriological quality of the water as these features are usually not due to conditions inherent in the aquifer but to extraneous causes or to the treatment of the water after it has been pumped to the surface.

During the investigation on which this report is based much information on water levels and artesian pressure was collected. Many thousands of individual measurements of water level or artesian pressure were made and continuous records of water levels were obtained by means of automatic water-stage recorders at one time or another in about thirty wells. Most of these records have been published by the Geological Survey in its annual reports on water levels and artesian pressure.[1] The remaining records will be published in forthcoming

[1] Meinzer, O. E., Wenzel, L. K., and others, Water levels and artesian pressure in observation wells in the United States: U. S. Geol. Survey Water-Supply Papers 777, 817, 840, 845, 886, 906, 936, etc. (Annual volumes since 1935.)

(8)

adjacent counties. Effective control should therefore be State-wide and the regulation of inter-state aquifers may require inter-state cooperation. Effective control should also be broadly inclusive. Restrictions applied to one class of water users and not to another would be futile as well as unfair. No diversion of ground water should be made without the prior approval of some unbiased agency empowered to safeguard this valuable natural resource against injurious overdevelopment.

OUTLINE OF GEOLOGY

Physical Divisions

Middlesex County lies within two major physiographic provinces, the Coastal Plain Province and the Piedmont Province. This division is based largely on rocks and structure projected from nearby regions, for in Middlesex County the topography would not warrant this subdivision, mainly because it has been modified by Quaternary deposits. The part of the county which is in the Coastal Plain Province is, roughly, that which lies southeast of a line from Plainsboro to Carteret. In this area the bed rock consists of unconsolidated or poorly consolidated sands and clays of Cretaceous age (see Stratigraphic Table, page 18, for geologic time-table) which dip at low angles to the southeast.

The Piedmont Province includes the area to the north and west of the Coastal Plain Province. It is underlain by relatively hard Triassic rocks, which in most regions stand up as rounded hills above the flat coastal plain. The prominences at Sand Hills are capped by outliers of the formerly more extensive Cretaceous sediments which have been protected from erosion by the numerous consolidated layers of "ironstone" (ferruginous sandstone) and the resistant Triassic diabase to the south. Farther north and east the Triassic shales have been eroded nearly as low as the Cretaceous sediments. This feature, together with the blanket of Quaternary deposits, has left little difference in the topography of the two provinces.

Geologic History

The geologic history of Middlesex County as observed from the rocks within its borders is necessarily far from complete. Much of it, however, can be read from rocks in nearby areas although other events are forever lost. References to the length of time which has elapsed since the deposition of some of the formations are of necessity approximate. They are based on age determinations from radio-active minerals and are given to indicate the slowness with which geologic processes operate, the vastness of the intervals in which there are no geologic records within the county and, to some extent, the relative age of the existing formations.

The gneiss of the Wissahickon formation, known only from well logs in Middlesex County, gives us the first chapter in the geologic history of the county. In pre-Paleozoic time, at least 600 million years ago, muddy sediments were deposited, which later were folded and metamorphosed (altered) and then intruded by highly heated molten rock. This igneous activity further metamorphosed and recrystallized the sediments so that they little resembled the original deposits.

A long period of erosion followed, during which the existing mountains and hills were reduced to a fairly level plain. This was followed by the development of a depression which extended from the Gulf of Mexico northeastward through the Appalachian belt and Canada, and which was occupied by an arm of the sea for many millions of years. The record of those years is read in the sediments which were deposited in the depression and in which we find today the fossils, or preserved remains of animals which lived and developed during that period (the Paleozoic era). Since these sediments are today found only northwest of Middlesex County, the presumption is that either this area was above sea-level during that entire period, or that such sediments as were deposited have since been entirely removed by erosion. Whichever assumption is right, the second oldest rocks which we find in Middlesex County today are the generally red-colored rocks of Triassic age, which are believed to be at least 400 million years younger than the Wissahickon formation.

The Triassic sediments in Middlesex County are believed to have been deposited in an intermontane valley in the latter part of that geologic period. During this same time there was considerable igneous activity, the most important of which was the intrusion of the thick sill of diabase known along the Hudson River as the Palisades. This sill is continuous in the Triassic rocks in Middlesex County from Carteret to Rocky Hill, but is found at the surface only from Deans to Rocky Hill. The Triassic rocks were later tilted, faulted and eroded during an interval of about 100 million years. This interval spanned all of the Jurassic period and more than half of the Cretaceous period.

In early Upper Cretaceous times the land surface in Middlesex County consisted of a plain of moderate relief sloping to the southeast at about 60 feet to the mile. The bed rock in the southern third of the

(9)

area consisted of the Wissahickon formation and the rest consisted of Triassic rocks, above which the resistant diabase sill stood as a ridge. Then the land was submerged and Upper Cretaceous sands and clays were deposited on it in alternating layers dipping to the southeast. These sediments tended to thicken oceanward so that the older sediments dipped parallel to the underlying plain while the higher formations were more nearly horizontal. During this period there were fluctuations in the depth of water, as indicated by the alternation of shallow and deep water fossils in the Cretaceous formations. The general relationship of the various rocks in the county is shown on the geologic section in figure 3.

In the Tertiary period which followed, there were intervals of deposition and of erosion, but any sediments which may have been deposited in Middlesex County have since been removed by erosion, together with much of the older Cretaceous deposits.

In the Quaternary period, which dates from the beginning of the Ice Age and in which we are now living—a period of some 2 million years—there were four advances of great ice sheets moving from centers in Canada into the northern part of the United States, interspaced with times of partial submergence and deposition. In Middlesex County there is evidence of only the last ice sheet. This consists of the Wisconsin drift which blankets the northern third of the county. The oldest non-glacial Quaternary deposits have been entirely removed from the county. The Pensauken formation, which is much older than the Wisconsin drift, is found capping the hills and higher divides but has been removed from the larger stream valleys. The Cape May formation, which is probably slightly older than the Wisconsin drift, is found mainly in stream valleys. Since the retreat of the Wisconsin ice sheet there have been only relatively slight physiographic changes in the county.

Outline of the Stratigraphy

The areal geology of Middlesex County is shown on figures 4, 5 and 6 on pages 19, 20, and 21. The geologic formations shown thereon range from soft, unconsolidated alluvial deposits formed within the last few thousand years, to compacted rocks whose origin dates back many millions of years. The following stratigraphic table, arranged in normal sequence (i. e. youngest formation at the top) includes a still older formation (the Wissahickon) which has been penetrated by a number of deep wells within the county. Detailed descriptions of the formations are given in the section on hydrology and geology of the rock formations beginning on page 52.

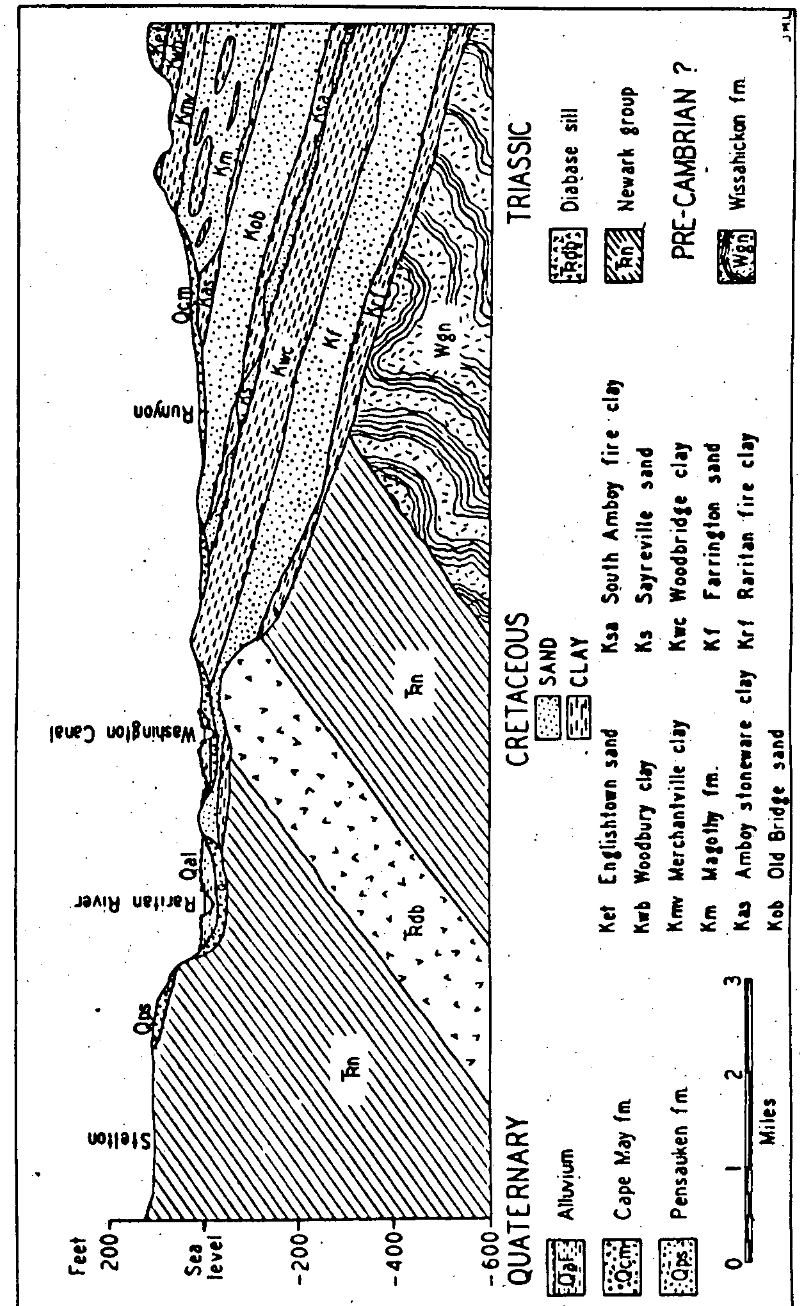


FIGURE 3.—Generalized geologic section from Stelton through Runyon to the county line.

STRATIGRAPHIC TABLE FOR MIDDLESEX COUNTY, N. J.

Cenozoic sequence
- Quaternary system
  - Recent series
    - Alluvium
    - Eolian deposits
  - Pleistocene series
    - Wisconsin drift
    - Cape May formation
    - Pensauken formation

UNCONFORMITY

Mesozoic sequence.
- Cretaceous system
  - Upper Cretaceous series
    - Mount Laurel and Wenonah sands
    - Marshalltown formation
    - Englishtown sand
    - Woodbury clay
    - Merchantville clay
    - Magothy formation
    - Raritan formation
      - Amboy stoneware clay
      - Old Bridge sand member
      - South Amboy fire-clay
      - Sayreville sand member
      - Woodbridge clay
      - Farrington sand member
      - Raritan fire-clay

UNCONFORMITY

- Triassic system
  - Upper Triassic series (Newark group)
    - Brunswick shale
    - Lockatong formation
    - Stockton formation

UNCONFORMITY

Proterozoic sequence (?)
- Pre-Cambrian (?)
  - Wissahickon formation

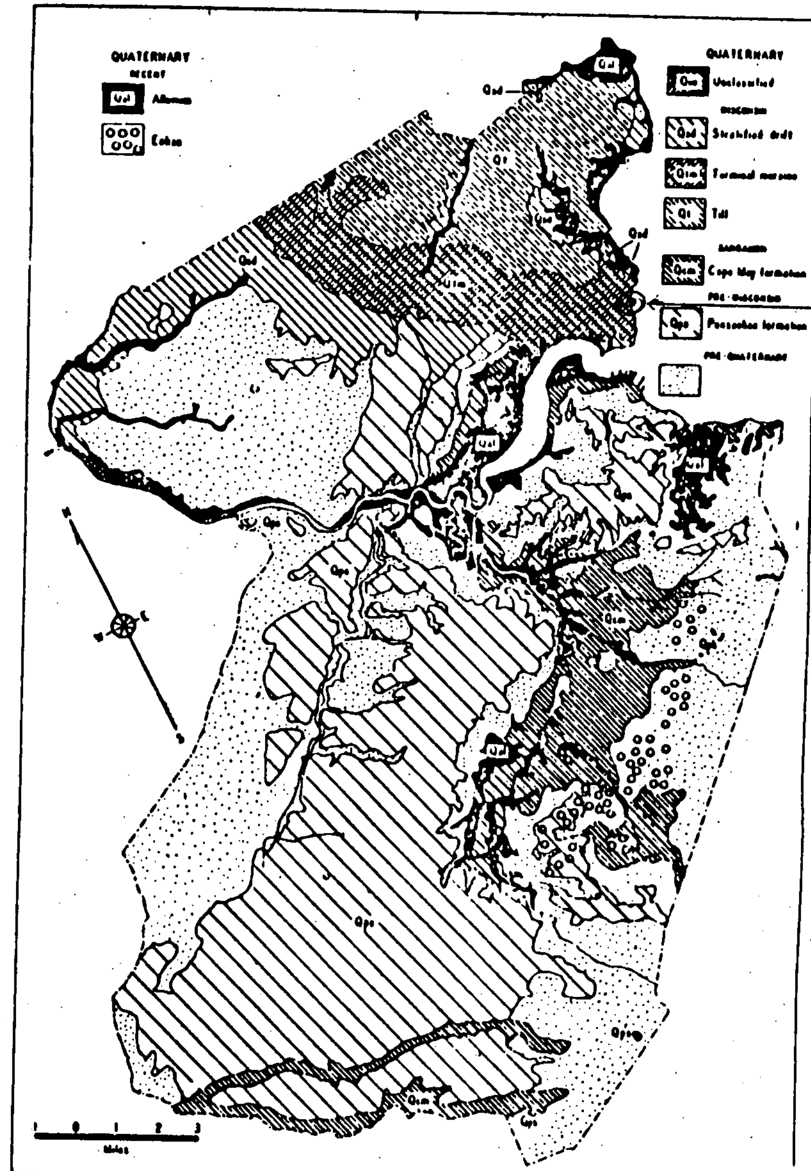


FIGURE 4.—Map of Middlesex County showing the areal distribution of the rocks of the Quaternary system. Small quantities of good water are obtained from the eolian deposits, the stratified drift, the Cape May and Pensauken formations, and the unclassified deposits.

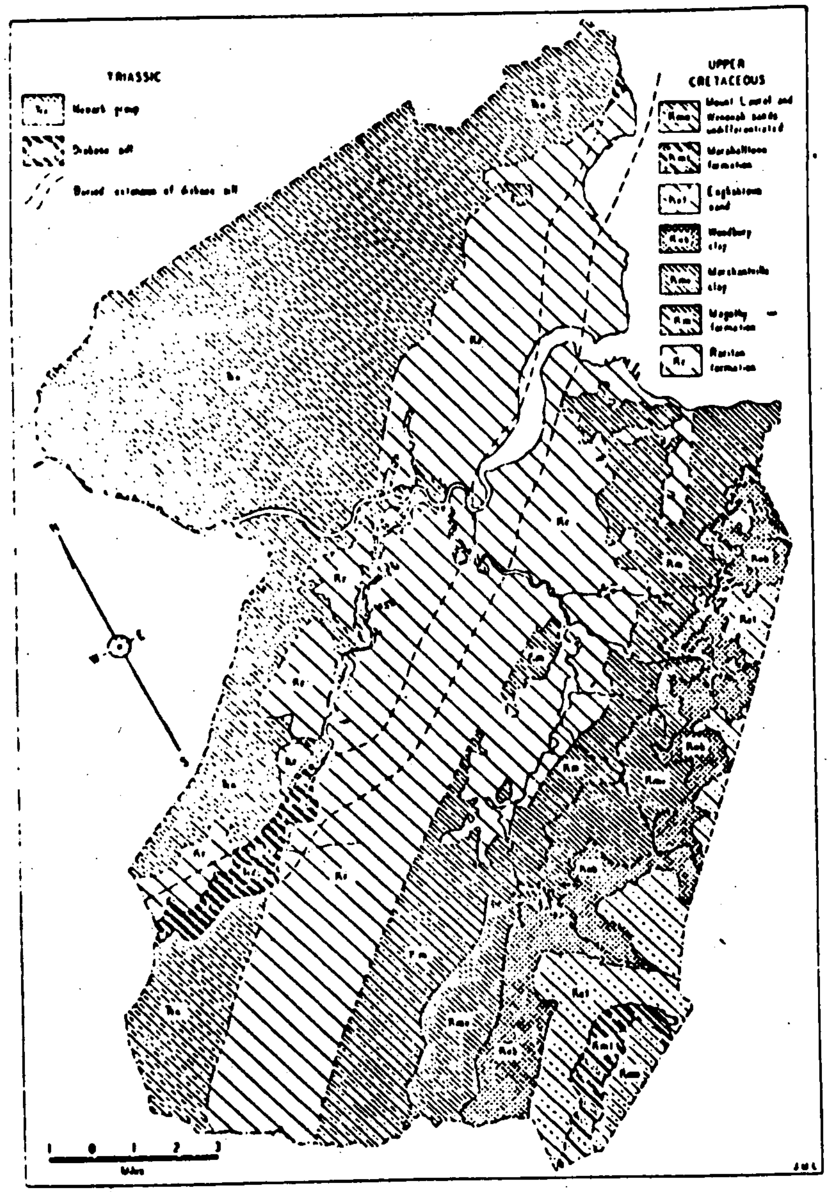


FIGURE 5.—Map of Middlesex County showing the exposures of the rocks of the Triassic and Cretaceous systems. Small quantities of good water are obtained from the Mount Laurel and Wenonah sands, the Englishtown sand and the Magothy formation within the county. Substantial quantities are derived from the Raritan formation and the rocks of the Newark group.

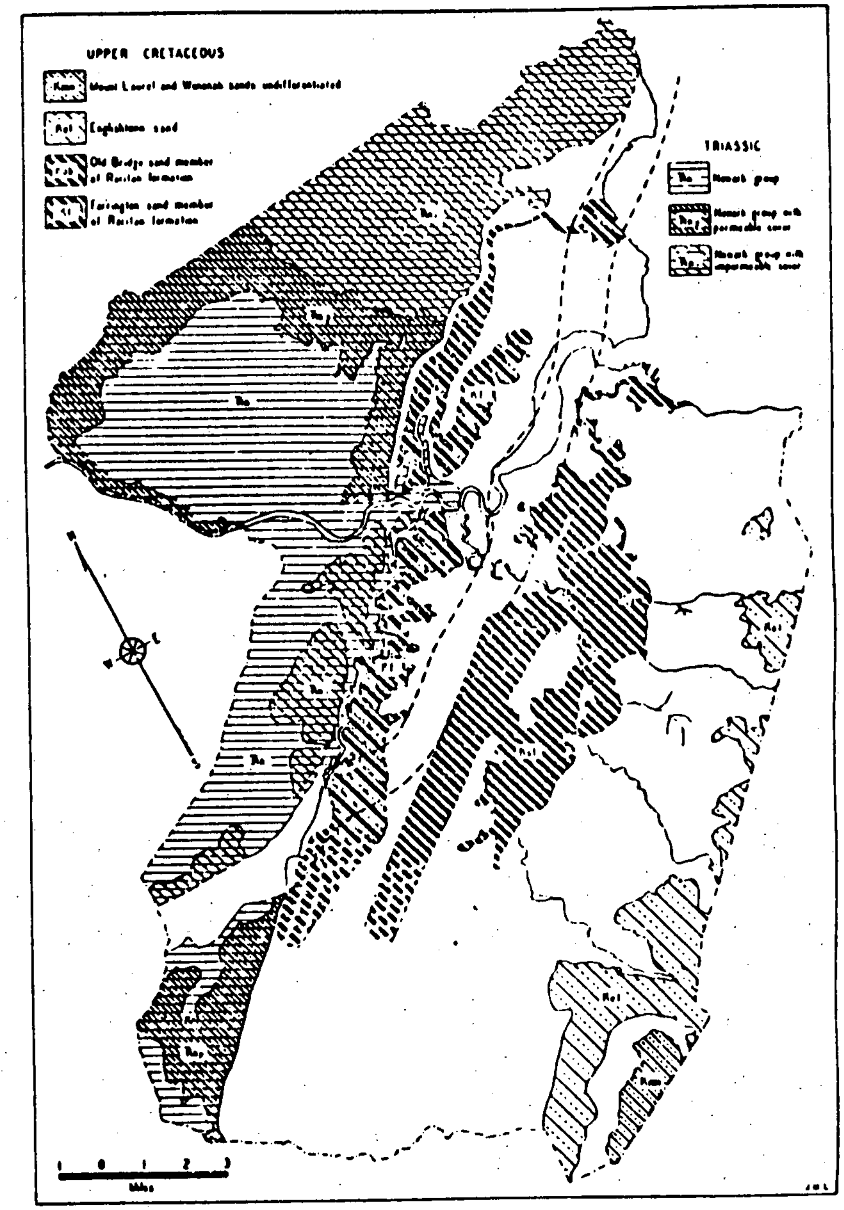


FIGURE 6.—Map of Middlesex County showing the intake areas of the important aquifers. Large quantities of good water are obtained from the Old Bridge and Farrington sand members of the Raritan formation. Small quantities are obtained from the Englishtown sand and the Mount Laurel and Wenonah sands. The rocks of the Newark group yield moderately large supplies where overlain by permeable materials, but elsewhere their yield is small.

(12)

MAGOTHY FORMATION

2187. Browntown; ¾ mile west of, from road cut about ¼ mile south of highway, 25 feet above base.
2190. do ; ¾ mile west of, from same location and about 2 feet above sample 2187.
2191. Cheesequake; Perrine's pit, 8 feet above base of formation.
2198. Runyon; 1¼ miles NE of, from small sand pit about 100 yards north of highway, about 10 feet above base.
1582. Browntown; ¾ mile SE of, Dr. Ostberg's well, 160 to 165 foot depth.

OLD BRIDGE SAND MEMBER OF THE RARITAN FORMATION

2167. South River; Marcus Wright's pit, 5 feet above water level, elevation above base of formation not determined.
2169. do ; Marcus Wright's pit, 11 feet above sample 2167.
2170. do ; do , 14 feet above sample 2168.
2171. do ; do , 24 feet above sample 2170 and 6 feet below contact with Pensauken formation.
2173. Parlin; Crossman pit, 8 feet above contact with South Amboy fire clay.
2174. do ; do , 18 feet above base of sand.
2175. do ; do , 28 feet above base of sand.
2176. do ; do , 39 feet above base of sand.
2177. do ; do , 48 feet above base of sand and 5 feet below contact with Pensauken formation.
2181. Old Bridge; South River Sand Company pit, 20 feet below contact with Amboy stoneware clay.
1630. Runyon; test well A-41, 13 foot depth.
1637. do ; test well K-1, 7 foot depth.
1638. do ; test well J-4, 7 foot depth.

SAYREVILLE SAND MEMBER OF THE RARITAN FORMATION

2172. Sayreville; from pit near Raritan River, 3 feet above contact with Woodbridge clay and 4 feet below contact with South Amboy fire clay.

FARRINGTON SAND MEMBER OF THE RARITAN FORMATION

2160. South River; abandoned sand pit about 1½ miles north of town, 20 feet above Raritan fire clay.
2161. Same pit as 2160, 25 feet above Raritan fire clay.
2162. Same pit as 2160, 35 feet above Raritan fire clay.
2163. South River; about 1 mile northwest of town, 2½ feet below Woodbridge clay.
2164. Same locality as 2163, 3½ feet below Woodbridge clay (represents locally coarse streak).
2165. Milltown; from highway cut about 1 mile east of town, 1 foot above Raritan fire clay.
2166. Milltown; Marcus Wright's pit, 13½ feet above Raritan fire clay.

The volumetric samples were collected by driving a sampling tube perpendicularly into a smooth flat surface of the aquifer. The depth to which the tube was driven was carefully measured. The material along one side of it was then excavated without disturbing the tube or its contents. The sample was cut off flush with the end of the sampler, transferred to a can and sealed for shipment to the laboratory. The known area of the sampling tube and the depth to which it is driven make possible a computation of the volume occupied by the sample in nature. The sampling apparatus and technique were devised by Mr. Meinzer and are described in detail by Stearns.[11] Volumetric samples are considered more reliable than samples from wells, because there is less likelihood of collecting foreign material or of losing fine particles from the sample. Furthermore in making determinations of porosity and permeability in the laboratory an attempt is made to adjust the volume of the sample to that occupied by it in nature.

A description of the laboratory procedure used to determine the various factors shown in the table and a discussion of their significance is also given by Stearns in the same paper. The significance of the coefficient of permeability and the various laboratory and field methods of determining it are further discussed by Wenzel[12] in a paper published in 1942. A brief discussion and explanation of the various features shown in the table is given below.

The apparent specific gravity is the specific gravity of an oven-dried sample of the sand including the pore spaces. It must not be confused with the specific gravity of the mineral grains composing the sand.

Mechanical analyses of granular materials are made by separating into groups the grains of different sizes and determining what percentage by weight each group constitutes. The United States Bureau of Soils[13] has adopted the following nomenclature and arbitrary limiting diameters, in millimeters:

Fine gravel	2 to 1
Course sand	1 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.1
Very fine sand	0.1 to 0.05
Silt	0.05 to 0.005
Clay	less than 0.005

[11] Stearns, Norah Dowell, Op. cit., p. 122.

[12] Wenzel, L. K., Methods for determining permeability of water bearing materials with special reference to discharging well methods: U. S. Geol. Survey Water Supply Paper 887, 1942.

[13] Mechanical analysis of soils: U. S. Dept. Agr. Bur. Soils Bull. 4, 1896. Briggs, L. J., Martin, F. O., and Pierce, J. R., The centrifugal method of mechanical soil analysis: U. S. Dept. Agr. Bur. Soils, Bull. 24, 1904. Fletcher, C. C., and Bryan, H., Modification of the method of mechanical soil analysis: U. S Dept. Agr. Bur. Soils, Bull. 84, 1912.

made only in the more recent complete analyses of water shown in the table. They seem to indicate, however, that all the ground waters in the county, with the possible exception of some water from the Magothy formation and possibly also some from the Newark group, contain too little fluoride to be of any significance. None of them contain enough fluoride to be harmful. Analyses of waters from other parts of New Jersey seem to confirm these conclusions.

HYDROLOGY AND GEOLOGY OF THE ROCK FORMATIONS

The geologic formations occurring in Middlesex County are discussed in the following pages in the same order that they appear in the stratigraphic table on page 18. Maps showing their areal extent are given on figures 4, 5, and 6. A brief geologic description of each formation or member listed in the table is presented. In general the reader is referred to the stratigraphic table and to the text accompanying it for the geologic age and relationship of the formations discussed in this section. Discussions of the groups into which the various formations or members fall is presented only when common features may best be described in this way. The hydrology of the various aquifers is presented in more or less detail depending upon their importance. Detailed discussions of the development and safe yield of the more important aquifers are also presented.

Cenozoic Sequence

QUATERNARY SYSTEM

Recent Series

ALLUVIUM

A preponderance of evidence indicates that since the retreat of the last glacial ice sheet, southern New Jersey has remained relatively static, with little or no movement of the land, either up or down, in relation to the level of the sea. During this period the streams have worked ceaselessly to remove the blanket of sand and gravel which had been deposited in all the larger valleys in Pleistocene time, and some of it, together with mud and organic material, has been redeposited in tidal flats and along stretches of the streams where the gradients are low. Such recently deposited material is known as alluvium and it covers several square miles in Middlesex County. It is relatively impermeable and of no importance as a source of water supply. Upstream from

tidal limits the deposits are small, and so far as known, everywhere less than 10 feet thick; but bordering Cheesequake Creek, the South, and the Raritan Rivers they are broad and very much thicker. In fact, test boreholes have shown that nearly two miles southwest of the mouth of Cheesequake Creek the alluvium—here a soft mud filling—is more than 50 feet thick. Of greater importance from a water-supply standpoint is the deposit of silt and mud which has accumulated in the channel of the Raritan River north and west of Sayreville and which blankets the underlying Farrington sand member of the Raritan formation and tends to prevent the contamination of that sand by salt water from the river. Test boreholes drilled prior to the construction of the Eastern New Jersey Power Company plant at Sayreville disclosed the fact that south of Crab Island the mud extends down 53 to 55 feet, within 2 feet of the underlying bedrock.

EOLIAN DEPOSITS

At present a large percentage of the southern half of Middlesex County is forested and winds have little effect in shifting the sand and soil of the region. That it was not so during some period since the deposition of the Cape May formation may be surmised from the sand dunes about one mile south of Spotswood and the rather widespread occurrence of typical Cape May material on the hilltops and higher slopes southeast of the South River between Matchaponix, Texas and Browntown. Similar material does not mantle the slopes northwest of the South River and it would therefore seem reasonable to suppose that the strong winds which accomplished this work came from the north or northwest. Because the wind-blown material is continuous with the undisturbed Cape May deposits it is impossible to separate them in mapping except on an arbitrary basis; and since elevation 40 is about the upper limit of the Cape May formation along the shore and in the valley of the South River, that elevation was made the dividing line in mapping these deposits.

In a few small areas the Eolian deposits overlie impermeable materials, and are sufficiently thick to yield satisfactory water supplies for domestic or farmstead purposes. In such places they provide the only water supplies available for such purposes without the construction of fairly deep drilled wells. Otherwise they have relatively little hydrologic importance.

(19)

Pleistocene Series

WISCONSIN DRIFT

The Wisconsin drift was deposited by the last of four huge continental ice sheets of Pleistocene age which covered portions of northern United States. It forms a nearly continuous mantle over the underlying Triassic and Cretaceous rocks in the northeast part of the county. The southern limit reached by the Wisconsin ice sheet in Middlesex County is roughly along a curved line from Plainfield to Metuchen and the mouth of the Raritan River at Perth Amboy. The glacier advanced from the north approximately to this line, then climatic conditions became such that the rate of movement southward just equalled the rate of melting with the result that the front of the glacier oscillated back and forth along this line. The ice dropped and piled up a huge mass of debris on its margin which forms the terminal moraine and the waters from the melting glacier deposited large amounts of gravel, sand and silt to the southwest forming an outwash plain. Later, as the climate became warmer, the ice front melted back leaving a blanket of till covering all of the county northeast of the moraine. The drift is of importance from a water-supply standpoint primarily because some parts of it are permeable enough to absorb water from precipitation and transmit it readily into the underlying beds.

The *outwash plain,* found between Metuchen, Plainfield and East Bound Brook, covers an area of about 16 square miles. It consists of layers of sand and gravel which together are called stratified drift and are so mapped on figure 4 on page 19. The stratified drift is about 10 to 60 feet thick on the eastern edge near the moraine. The material becomes finer and the deposit thins to the west so that at its irregular western border it is largely sand. In general the stratified drift is quite permeable, but it is too thin and covers too small an area to be in itself an important source of water. However, it holds water which percolates into the underlying Triassic rocks and this has increased the yield of a good many wells in that formation over and above the average yield of wells drawing from uncovered Triassic shale.

The *terminal moraine* is composed of a mixture of red clay, sand, gravel and a few boulders. In most places the material is fairly impermeable and does not yield much water, but in a few localities there are beds of stratified permeable material and the yield is higher. Because these areas are small, however, large supplies are not available.

The southwestern or outer margin of the terminal moraine is fairly well defined, as its surface rises fairly abruptly 100 to 150 feet above

the outwash plain. The moraine is from one to one and one-half miles wide, and its inner border is less well defined because it grades into the till plain to the northeast. The surface of the moraine is a series of hummocks and depressions, many of which are undrained and because of the impervious nature of the material are filled by small lakes. The thickness of the moraine is variable but ranges between 80 and 150 feet.

A *till plain* of Wisconsin age covers the area from the terminal moraine to the northeastern edge of the county. The till is similar to the morainic material and consists of unassorted and relatively impermeable red clay, sand, gravel and boulders derived largely from the underlying Triassic rocks. Its average thickness is only 20 to 30 feet with about 80 feet as a maximum. It is not an important source of ground water.

In some places the materials composing the terminal moraine and the till plain are so impermeable that they probably act as a roof over the underlying rocks and exclude from them much of the water from precipitation and from stream flow. This is indicated by the number of small ponds that have formed in depressions on these materials. On the whole it is probable that they do not increase but may decrease the amount of ground water that might otherwise be available from the underlying rocks.

CAPE MAY FORMATION

The Cape May formation is typically a pinkish-yellow, fine to medium-grained quartz sand with occasional small pebbles of quartz and ironstone, but it sometimes departs considerably from this type. For example, just north of the railroad station at Morgan, it is well exposed in a small pit where the basal portion is approximately 50% gravel, whereas the upper 5 feet of the deposit is fully 75% sand. The pebbles are chiefly quartz, but ironstone and unaltered flint were also noted. Five hundred feet north the pebbly lower portion is lacking.

In the valley of the South River and along the south shore of the Raritan River the Cape May formation is rather consistently true to type and in general forms a rather thin mantle only three to ten feet thick over the underlying Cretaceous sediments except where it fills the pre-Cape May channels of these streams. North of the Raritan River, however, there is a marked change in the composition of the Cape May. There it contains numerous partly rounded pebbles and fragments of Triassic red sandstone and shale, as well as fairly numerous lumps of Cretaceous clay. Apparently in Cape May time there were

13

RARITAN FORMATION

The Raritan formation is composed of alternating and irregular beds of clay, sand and gravel. The sands are predominantly white or light-colored, but gray and yellow beds are not uncommon, particularly in the region west of Jamesburg, and sometimes they are colored pink or orange by small percentages of iron oxides. The clay beds range in color from white through cream and light gray to dark gray and brick red. In composition they range from dark, sandy and lignitic beds, usually containing many nodules of pyrite or marcasite, to white-burning, highly refractory clays of great value. Many of the sandy beds are relatively clean or free of clay, but all gradations occur from nearly pure quartz sand to beds containing a high percentage of clay, muscovite, limonite, feldspar or other minerals. Lignite is a fairly common constituent of both the sands and the dark impure clays.

Most of the Raritan formation is believed to have been formed in shallow, brackish water and in estuaries and lagoons rather than in the open sea. This belief is based not only upon the variable character of the formation and the lignite, but also upon fossil evidence; numerous remains of land plants having been found in an excellent state of preservation near the middle of the formation in the Woodbridge region.

Although the horizontal extent of any one bed in the Raritan formation is not very great, it is nevertheless possible to divide it into several fairly distinct and mappable units in most of Middlesex County. These units are alternating layers of sand and clay. The clays of the Raritan formation have been extensively used in the ceramic industry and have been the subject of several reports by the Geological Survey of New Jersey. In them the clays received informal names because of their economic importance. The other members, composed dominantly of sand, were not given names but received numbers. In this report, where attention is focused on the sand members, it is proposed to give these members names. Thus, the units in the Raritan formation are from top to bottom:

Amboy stoneware clay
Old Bridge sand member (No. 3 sand of previous reports)
South Amboy fire-clay
Sayreville sand member (No. 2 sand of previous reports)
Woodbridge clay
Farrington sand member (No. 1 sand of previous reports)
Raritan fire-clay

A description of these units follows.

AMBOY STONEWARE CLAY

The Amboy stoneware clay varies in color from a light gray through darker grays to a nearly black clay with considerable carbonaceous material. Rarely it has a red mottled appearance. In some places it consists of a gray, more or less sandy clay resting on the white Old Bridge sand, but in other places the gray clay is underlain by as much as 10 feet of black carbonaceous clay. In turn the gray clay may be overlain with as much as 15 feet of black sandy clay. The black clay is lignitic and very similar to black clay in the Magothy formation, except that as a rule the black lignitic clays of the Magothy contain small rounded grains of amber. These are not common in the Raritan formation.

The Amboy stoneware clay was deposited on an uneven surface and was partly eroded before the deposition of the overlying Magothy formation. Its thickness ranges from 0 to 30 feet. Where present it forms an impermeable layer between the Magothy formation and the Old Bridge sand member of the Raritan formation.

OLD BRIDGE SAND MEMBER

GEOLOGY

The most productive aquifer in Middlesex County is the Old Bridge sand, a member of the Raritan formation. This sand has not been identified in outcrop very far south of Jamesburg, or anywhere north of the Raritan River or the Raritan Bay. It crops out or is exposed beneath permeable Pleistocene deposits in an irregular band that extends from the Raritan Bay near South Amboy to and probably beyond Jamesburg. Along this band which is shown on figure 6 and which has an area of about 25 square miles, the sand is exposed to the direct infiltration of meteoric waters. As is the case with the major coastal plain formations it dips gently to the southeast and has been identified in wells several miles from its outcrop in that direction.

The Old Bridge sand is the No. 3 sand member of previous reports containing descriptions of the Raritan formation. The name Old Bridge was selected because the sand crops out at several places in and near that village. One of the best exposures is at the pit of the South River Sand Company about half a mile northeast of Old Bridge. Furthermore, Old Bridge is the center of the greatest ground water develop-

North of the Raritan River, the Sayreville sand consists of layers of fine, white, micaceous sand, cross-bedded fine to coarse-grained white sand, with or without layers of white clay, and beds of arkosic sand. The general thickness is about 35 to 40 feet. The beds are so variable that there is no order of stratigraphic sequence over more than a small area. The lenses of arkosic sand, which may be as much as 12 feet thick were once used in the manufacture of fire brick near Perth Amboy.

Though a conspicuous member of the Raritan formation in the vicinity of Woodbridge and Perth Amboy, the Sayreville sand is thin or lacking in the vicinity of Runyon. In the prominent hill half a mile southwest of the southern approach to the Victory Bridge over the Raritan River it is a fine to coarse-grained white sand, arkosic towards the base, and about 40 feet thick. A mile to the southwest it is markedly cross-bedded, contains thick beds of ironstone and is only 15 feet thick. In a good exposure in Sayreville, due south of Crab Island, it is only 6 to 7 feet thick; and though the sand is fairly coarse, it contains lumps and thin lenses of white clay. Just 1,400 feet farther southwest, in the large pit of the Sayre & Fisher Brick Company, the sand is lacking and the South Amboy fire-clay can be seen directly overlying the laminated clays of the upper part of the Woodbridge clay. This same relationship can be observed in the pit of the New Jersey Clay Products Company, one and a quarter miles to the south-southwest. This "pinching out" of the Sayreville sand is the chief reason why not one well southeast of the Camden and Amboy Railroad is yielding water from this stratum. Carefully kept logs of wells and test boreholes show that even though it is sometimes present in the Runyon area, it is thin and clayey and not therefore an important aquifer.

No important water supplies have been developed from the Sayreville sand. In fact, not a single well is known to draw its water entirely from it and it was, therefore, impossible to obtain a sample of water for analysis. However, the South Amboy fire-clay which separates the Sayreville sand from the overlying Old Bridge sand, is irregular and sometimes absent so that in one or two wells there has apparently been no separation between these two sands, and at least one well probably draws water from both the Old Bridge and the Sayreville sands.

One sample of sand was collected from this member for analysis in the Water Resources Laboratory during the present investigation. The analysis in the table on page 42 indicates that the sample contained a considerable amount of clay and other fine materials. Its porosity was

44 percent, and its moisture equivalent was 12 percent. It would appear, therefore, that the specific yield of the sand is only about 32 percent and that its ability to store water is not as great as most of the other sands in the county. Analyses of two other samples from this sand are reported by Stearns,[22] and they indicate a probable specific yield of about 39 percent, which is more in line with the other sands in the area. The analysis on page — shows that the coefficient of permeability of the recent sample from the Sayreville sand was only 30, indicating that water would move through it very slowly under ordinary conditions. The two samples reported by Stearns indicate an average coefficient of permeability of about 500 which again is more in line with the other sands in this area. Samples of this sand subsequently obtained from wells, although not analyzed in the laboratory, appeared to contain a smaller percentage of fine or clayey material than the sample sent to the laboratory. A recent examination of this sand where exposed in another pit tends to confirm this conclusion. It seems probable, therefore, that the capacity of the Sayreville sand to store and transmit water is fairly high in some places. Nevertheless its thinness and lack of continuity make it most unlikely that any substantial water supply can ever be developed from it.

WOODBRIDGE CLAY

The Woodbridge clay underlies the Sayreville sand and ranges from 50 to 90 feet in thickness where uneroded. The upper portion consists of well stratified, dark-gray clays containing a sufficient amount of fine-grained sand to make an ideal material for the manufacture of common brick, and it is widely used for that purpose. The middle portion of the member commonly consists of gray clay, though sandy clays or clayey sands may occur. Both the upper and middle portions of the Woodbridge clay are extensively used in the manufacture of hollow tile. The basal portion of the member contains beds of compact, tough, and highly refractory fire-clay which are white, light-gray or brick red in color.

Nodular masses of impure siderite are common in the upper portion of the Woodbridge clay near Sayreville and the South River and when present they aid in its identification. These nodules contain marine fossils thus showing that marine conditions probably prevailed for at least a part of Raritan time. The upper part of the clay also contains lignite and pyrite. Dinosaur footprints have been found in the Wood-

[22] Stearns, Norah Dowell, Laboratory tests on physical properties of water-bearing materials; U. S. Geol. Surv. Water Supply Paper 596-F, 1927, pp. 166-167, Samples 71 and 74.

(17)

bridge clay and these, together with the lignite, indicate that a marine environment may not have existed throughout all of Woodbridge time.

Quite apart from its economic importance as a source of clay, this thick and widespread unit in the Raritan formation is of great hydrologic importance because it forms an impervious cover over the prolific Farrington sand. It limits the intake area of that sand to the area of its outcrop and farther down the dip, confines the water in the sand so that it occurs under artesian conditions.

FARRINGTON SAND MEMBER

A report describing the water supplies of the Farrington sand or No. 1 sand of previous reports dealing with the Raritan formation, was published in 1937.[23] The description of the sand and of the water supplies from it in this report are, therefore, somewhat abbreviated and emphasis is placed upon new data collected since the preparation of the earlier report. This sand occurs both north and south of the Raritan River and probably across the Arthur Kill on Staten Island. Not much water is pumped from its intake area, but it is tapped by wells in many places down the dip from the intake area where the water is encountered under artesian pressure.

Geology

The Farrington sand lies beneath the Woodbridge clay. As indicated on figure 6 on page 21, it crops out in a conspicuous band nearly a mile wide along the southeast edge of Farrington Lake where several sand pits give a good opportunity to examine it. A large amount of water enters the sand in this area which makes it very important from a hydrologic standpoint. For the above reasons, this member is called the Farrington sand in this report.

The upper part of the Farrington sand is generally medium to fine-grained. The lower portion, 10 feet to 20 feet thick, is a coarse, arkosic, light-gray or light-yellow sand usually containing a considerable sprinkling of small pebbles. The arkosic material, as seen in outcrop, is always partly kaolinized, the white kernels of the partly decomposed feldspar standing out sharply in contrast with the gray and yellow colors of the sand and gravel. The latter is composed chiefly of well rounded quartz pebbles, but also contains numerous pebbles of flint ranging in diameter from a quarter of an inch to a maximum of two inches. Occasionally the gravelly beds contain rather numerous small chunks of red or white clay, quite obviously derived from the underlying Raritan fire-clay and evidently redeposited close to their source. Lenses of clay, usually only a few feet thick, also occur within the limits of this member and thin clay seams are fairly common.

[23] Barksdale, Henry C., Water Supplies from the No. 1 Sand in the Vicinity of Parlin, New Jersey, Special Report 7.

As recorded in well logs, the sand is often divided by clay lenses into two or more parts, but since the static levels of the water from all parts of the member are about the same for any one location, the dividing clay beds are evidently of very local extent. The following log was compiled from samples obtained from a test well drilled for the Borough of Sayreville about a mile and a quarter northwest of the Runyon pumping station.

Partial log of test well at Sayreville, New Jersey

Sample depth	*Description*	*Formation*
118–120	Clean, fine to coarse-grained, light gray sand with a little lignite and pyrite.	
120–137	Clean, coarse-grained sand and small gravel (including unweathered flint). Some grains cemented by pyrite. A little fine-grained sand and some lignite at 132 feet.	Farrington sand member of the Raritan formation.
137–163	Light gray clay with a little sand.	
163–180	Coarse gray sand and small pebbles.	
180–198	Coarse, light gray sand and gravel.	

It will be noted that the full thickness of the member is 80 feet. Half a mile southwest at the pumping station of the Borough of South River, the reported thickness in a deep well was only 44 feet; but at the Anheuser-Busch plant half a mile southwest of Old Bridge it is 78 feet 8 inches thick, at the Peter J. Schweitzer Company plant in East Spotswood it is 56 feet thick, at Runyon it is 91 feet thick and near Parlin it ranges from 50 to 104 feet thick. It is known to be continuous to the southwest at least as far as Jamesburg as it was found (83 to 129 feet thick) in the wells at the New Jersey State Home for Boys two and a quarter miles to the east-southeast and in a test borehole 0.85 mile east of Dayton and 3 miles west-northwest of Jamesburg. The Farrington sand dips to the southeast at the rate of about 55 feet per mile.

(18)

Northeast of Parlin the member thins, the sand becomes finer grained and sometimes quite clayey, and in South Amboy wells drilled to this horizon have been only moderately successful. In the district between Parlin and Jamesburg, however, the Farrington sand is one of the best aquifers in the State. Wells of large diameter and modern construction have yielded as much as two million gallons daily, and nearly all of them are rated in excess of half a million gallons daily.

The Farrington sand is thin or lacking above the buried trap ridge between the Borough of South River and Perth Amboy as shown in figure 3 on page 17. A great many wells have been drilled in this area, but those over the trap ridge with the exception of a few within a mile or so northeast of the Borough of South River have not been as successful as wells to the northwest or southwest. Hydrologically this is important because the thinning of the Farrington sand on the ridge tends to prevent the movement of salt water from the intake under the Raritan River to the centers of pumpage to the southeast.

Physical Properties

The results of laboratory tests on seven samples of this sand taken at different exposures along its outcrop are given in the table on page 42. The coefficient of permeability of the sand as determined by these tests ranges from 210 to 3,500, and a weighted average would probably be between 1,200 and 1,500. Pumping tests at the Perth Amboy Water Works gave figures for the coefficient of permeability which were in this same order of magnitude. The specific yield of the sand, as indicated by the average difference between its porosity and its moisture equivalent, is about 32 percent. With a specific yield of 32 percent, a block of the Farrington sand one foot thick and one square mile in area, would be capable of storing about 67 million gallons of available water.

Quality of Water

The uncontaminated water from the Farrington sand is exceptionally good for most purposes. Its quality varies slightly from place to place, but the total solids are usually less than 40 parts per million. The hardness is usually less than 15 parts per million. The only feature of this water that is sometimes objectionable is its iron content, which ranges from 2 to 6 parts per million in some localities.

The chloride content of the water from the Farrington sand is normally only 2 to 4 parts per million, but the sand has been contaminated by the intrusion of sea water in several places in the county.

Where this has occurred, the water has become highly mineralized and unfit for any ordinary use except cooling. Samples collected from wells in the contaminated areas have been found to contain from 10 to 7,675 parts per million of chloride. The other minerals contained in sea water, notably the hardness-forming minerals, calcium and magnesium, have, of course, increased in proportion to the increase in chlorides so that the water rapidly becomes less desirable, even before the concentration of salts renders it useless. The degree and extent of the contamination has tended to increase with continued pumping. The area, extent, and probable significance of the very serious problem created by the salt-water intrusion into this sand is discussed on pages 115 to 139.

Development and Pumpage

The first water supply developed from the Farrington sand south of the Raritan River was at the Perth Amboy Water Works at Runyon where a well tapping it was drilled in 1897. About the same time industrial wells drawing from this sand were drilled in the city of Perth Amboy. For several years after 1897 the Farrington sand at Runyon was the principal source of water supply for the city of Perth Amboy. Later this supply was augmented by pumping from the Old Bridge sand, and water from both sands was used. In Middlesex County the water from the Farrington sand is now used almost exclusively for industrial purposes.

Before the beginning of the World War of 1914, only a few industrial plants in Perth Amboy, South Amboy, and Sayreville were using water from the Farrington sand. The total pumpage from the sand within the county probably did not exceed one or two million gallons daily at that time. The favorable location of the region for export trade produced a sudden increase in industrial activity during the war and a corresponding increase in the use of water from the Farrington sand. Unfortunately there are practically no records of pumpage during these years, but from the information available about the capacity of the wells then in use it seems probable that the total rate of pumpage from the sand within the county did not exceed 7 million gallons daily.

Many of the industrial plants established in this area during the war were adapted to peace-time operations and continued or increased their use of water. New industries were attracted to the area and the pumpage increased still more. A table showing withdrawals from the Farrington sand for the years 1929 through 1935 was included in the earlier report on this sand.[21] This table has been revised and extended through 1942 and is given as table 8 below. It covers the period 1929 through 1942, and gives separately the pumpage from the sand by the Perth Amboy Water Works and by the wells of the Duhernal companies, as well as a summary of other pumpage both north and south of the Raritan River.

TABLE 8.—QUANTITY OF WATER PUMPED FROM THE FARRINGTON SAND MEMBER OF THE RARITAN FORMATION IN MIDDLESEX COUNTY, NEW JERSEY, 1929-1942

Year	North of Raritan River	Duhernal Companies	Perth Amboy Water Dept.	Other Pumpage South of Raritan	Total
	In thousands of gallons daily				
1929	2,080	6,202	92	203	8,577
1930	1,970	5,964	877	309	9,120
1931	1,583	5,053	1,173	342	8,151
1932	[illegible]	4,352	1,198	398	7,188
1933	[illegible]	5,442	187	377	7,227
1934	1,315	6,570	135	369	8,389
1935	1,331	8,129	585	407	10,452
1936	1,879	9,094	655	408	12,036
1937	2,066	8,434	650	404	11,554
1938	1,874	5,495	0	408	7,777
1939	1,895	6,358	546	424	9,223
1940	1,975	4,785	301	402	7,463
1941	1,922	4,828	772	996	8,588
1942	1,875	4,015	620	556	7,066

The pumpage from the Farrington sand reached a peak in 1936 when it amounted to slightly over 12 million gallons a day. Approximately 9 million gallons a day of this amount was pumped by the industries in Sayreville Township. Intrusion of salt water into this sand at the Washington Canal caused the development of the Duhernal well field which derives its supply from the Old Bridge sand and made possible a substantial reduction in the pumpage from the Farrington sand by these industries. In 1942 the pumpage was only 4 million gallons a day, a drop of 5 million gallons a day from 1936. The decrease would probably have been even greater had it not been for the increased industrial activity due to the present war.

Pumpage from the Farrington sand by the Perth Amboy Water Department at Runyon during the period 1929-1942, inclusive, has varied from an average rate of 92,000 gallons a day in 1929 to a maximum rate of 1,198,000 gallons a day in 1932. Only one large capacity well tapping the Farrington sand is used. It is now pumped only to supplement the supply from the wells tapping the Old Bridge sand when the yield of those wells is low due to drought or when the demand for water is exceptionally great.

[21] Barksdale, H. C., Op. Cit., Special Report 7, p. 14.

Consumption of water from the Farrington sand north of the Raritan River has varied between 1,200,000 gallons a day and 2,100,000 gallons a day since 1929. This water has been used entirely by industries in Woodbridge and Raritan Townships and in the City of Perth Amboy. Until recently a great deal of the pumpage in this area was concentrated in and near Perth Amboy. Because of contamination of the sand by salt water, however, most of the industries within the city now obtain water from the Perth Amboy Water Department. The total pumpage from the Farrington sand north of the Raritan River has not varied greatly, however, because increases in Woodbridge and Raritan Townships have offset the reductions in Perth Amboy.

Factors Affecting Safe Yield

In general, there are three factors that may limit the safe yield of an artesian aquifer such as the Farrington sand: its available recharge, its capacity to transmit water from the intake area to the well fields, and the possibility that some form of contamination may be induced or accelerated by the pumping. The true safe yield of the sand is that rate of pumping which does not exceed any of these three factors. Whichever factor permits the smallest quantity of water to be removed from the sand is the limiting factor and determines the safe yield.

Available Recharge

The recharge in the intake area of the Farrington sand was estimated in the previous report to be about 950,000 gallons daily per square mile, or 20 inches of the water from precipitation each year. The intake area of the sand as far as it has been defined is about 17 square miles, as is shown in figure 6 on page 21, and the recharge in this area is accordingly estimated to be about 16 million gallons daily. The sand is separated into two parts by the estuary of the Raritan River and by the underlying trap ridge. Recharge occurring north of the Raritan River is believed not to be available to wells south of the river and vice versa. The intake area north of the river is approximately 6.8 square miles, and its recharge is estimated to be about 6.5 million gallons daily. The intake area south of the river, so far as it has been defined, is about 10.2 square miles, and its recharge is estimated to be about 9.7 million gallons daily. The area at its southeastern end shown by shading in figure 6, is not very well defined, because of the depth of the overlying Quaternary deposits. The sand probably extends still farther south, because it is believed to have been encountered in the deep well of the Cranbury Water Company. Any additional intake area in this direction, however, is so far from the present centers of pumping that it would probably not supply any appreciable amount of water to them.

Artificial Recharge. The natural intake capacity of the Farrington sand could, no doubt, be increased by artificial recharge. However, there has as yet been no attempt to recharge this sand artificially. The easiest and most obvious method of inducing artificial recharge would be the location of ponds on some of the smaller streams that cross its intake area, both north and south of the Raritan River.

Another possible means of recharging the sand would be to introduce water into it through wells. This method is expensive, however, and the techniques involved have not been developed to an extent that makes it thoroughly reliable. In order to successfully recharge the sand through wells, the water used should be absolutely free from any material that would be deposited in the sand outside the recharge well and thus reduce its capacity. If surface water were used for this purpose, it should be filtered and preferably sterilized as well to prevent the clogging of the sand by solid particles or by the growth of microorganisms. Recharge wells may, of course, be redeveloped from time to time to restore their capacity, but it is difficult to maintain the original capacity of such a well even with the best of care, especially if the recharge water is not carefully prepared. Recharge of the Farrington sand through wells might be considered in the vicinity of Parlin and South Amboy, in order to retard the advance of salt water and possibly force it out of the sand. Elsewhere in the county it is not believed to be economically justifiable.

If the fullest possible use were made of all opportunities for artificially recharging the Farrington sand, it might be possible to increase its total recharge by several million gallons daily. It must be borne in mind, however, that the surface water diverted into this sand would not be available for use elsewhere. For example, the principal streams south of the Raritan River that flow across its intake area discharge into Lawrence Brook, which is being used by the city of New Brunswick as a source of public water supply.

Capacity to Transmit Water

The capacity of the Farrington sand to transmit water from the intake areas to the various wells as indicated by the coefficient of permeability of the samples analyzed in the laboratory is relatively high. It

appears improbable that this factor would limit the safe yield of the sand. For the purposes of estimating, the average coefficient of permeability may be assumed to be 1,350, and 80 feet may be used as the average thickness of the sand. In June, 1936, when the rate of pumping from the Farrington sand in the Parlin area was near its maximum (9.4 million gallons a day), water levels in the vicinity of Parlin, as determined from the duPont and Hercules observation wells averaged about 57 feet below sea level. At the same time the water level in the intake area of the sand, as determined from the Fischer well, was about 60 feet above sea level, making a total difference in head of 117 feet between the intake area and the area of pumping. The average distance from the intake area to the approximate center of pumping at Parlin is about 5 miles. The average gradient was, therefore, about 23.4 feet per mile. With this hydraulic gradient the sand would transmit 1,350 x 80 x 23.4 or about 2.5 million gallons a day for each mile of its width. South of the Raritan River the width of the aquifer is at least 10 miles so that it might transmit 25 million gallons daily under the assumed conditions. In the immediate vicinity of the individual pumped wells, where the gradients are much steeper, the rate of flow was, of course, much greater.

The capacity of the sand to transmit water may also be judged by a study of the effect of pumping different quantities of water upon the head of the water in the sand at various points. The relation between pumpage from the Farrington sand and the water levels in various observation wells tapping this sand is shown on figure 11 on page 112. The location of all the wells on this diagram except the Fischer well are shown on figure 12. The location of the Fischer well is shown on figure 2, on page 6, because it is outside the limits of figure 12.

This diagram shows the pumpage by months and the fluctuations of water level in several observation wells tapping this sand. The pumpage is subdivided to show the amount taken from the wells of the Duhernal companies and the amount taken from the well at the Perth Amboy Water Works. Water level fluctuations are shown in five wells. Two of these are at Parlin: an observation well at the duPont plant, and an observation well at the plant of the Hercules Powder Company. The other three are an old deep well at Runyon, a test well at the site of the proposed Sayreville Water Works, and the Fischer well, which is an observation well in the intake area of the sand several miles from any center of pumping.

(2)

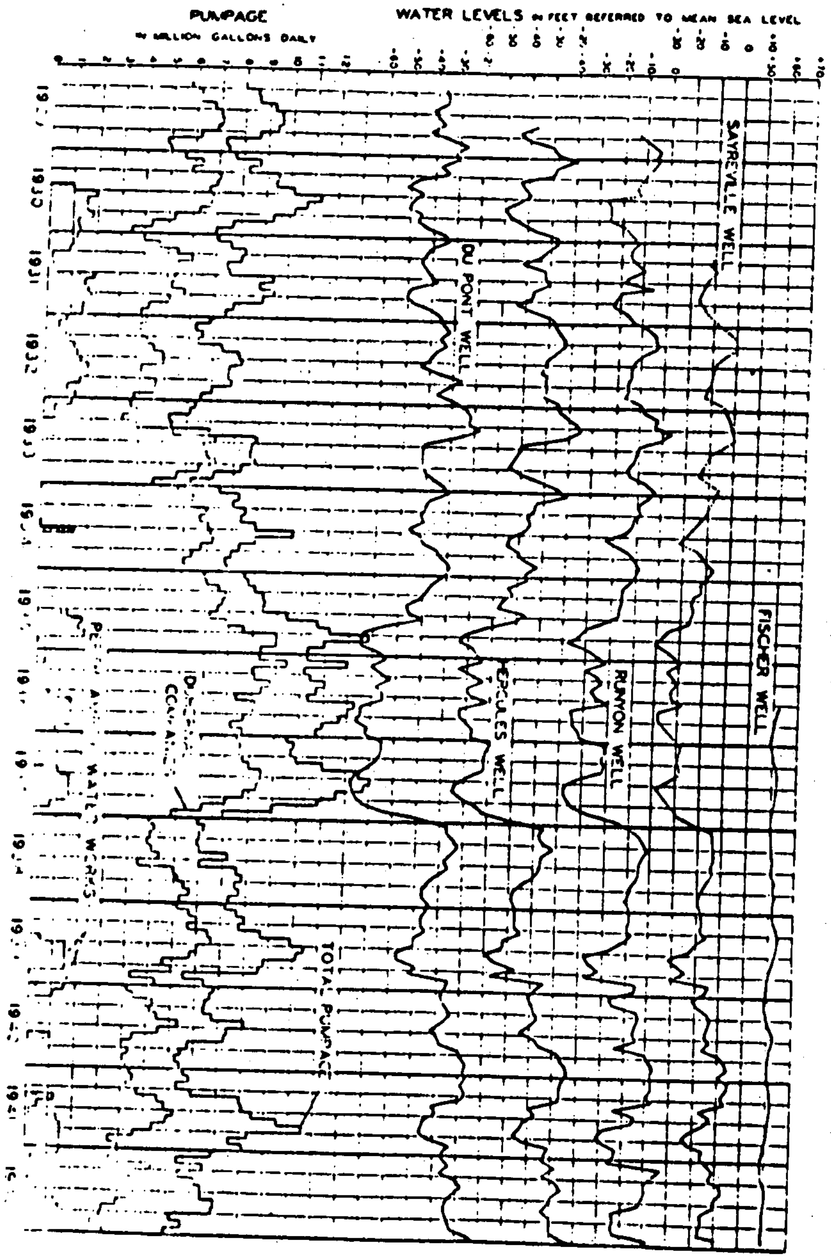


FIGURE 11.—Diagram showing the relation between water levels and pumpage in the Farrington sand member of the Raritan formation, 1929 to 1942. For locations of wells see Figs. 2 and 12.

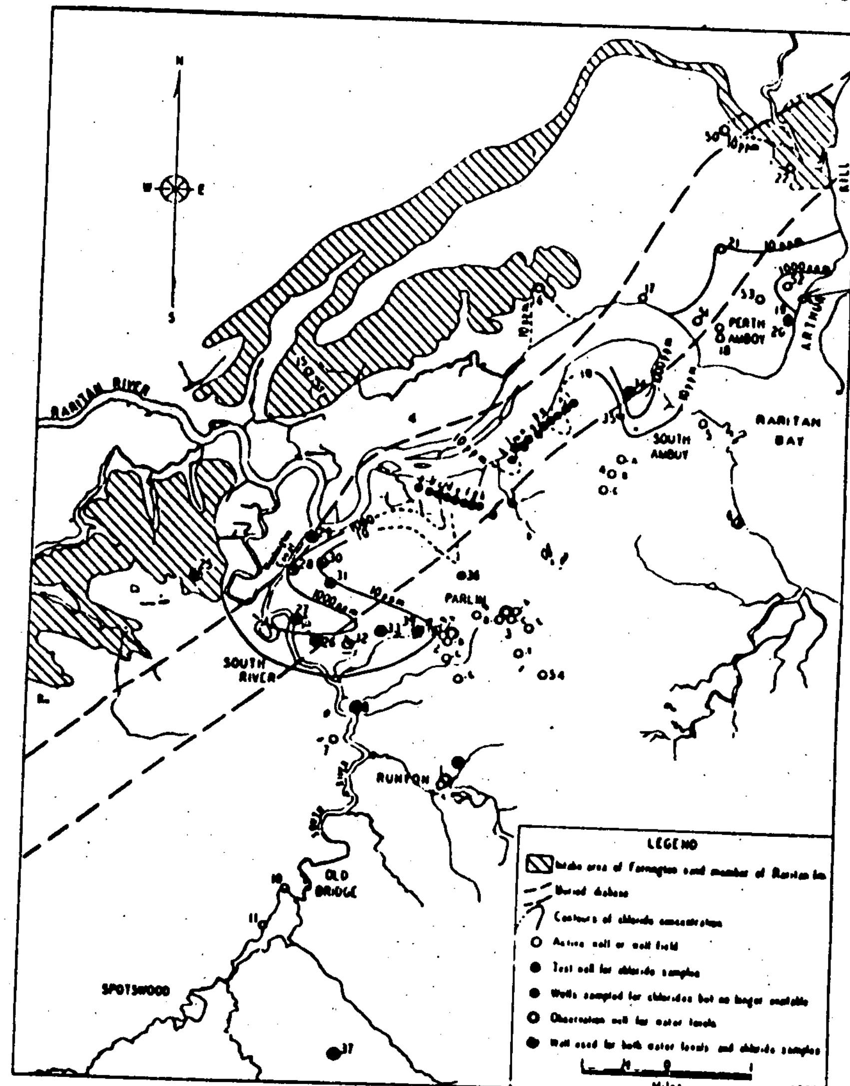


FIGURE 12.—Map of the area between Perth Amboy and Spotswood showing the location of wells tapping the Farrington sand, the intake area of this sand, and the approximate extent of the salt-water intrusion into this sand

KEY TO WELL NUMBERS

1. Perth Amboy Water Department
2. Hercules Powder Company (5 wells)
3. E. I. duPont deNemours & Company (6 wells)
4. National Lead Company (3 wells)
5. Jersey Central Power & Light Company (2 wells)
6. South Amboy Water Department (3 wells not used)
7. South River Water Department (2 wells)
8. Sayreville Borough (5 test wells)
10. Anheuser-Busch Company
17. Carborundum Company (2 wells)
18. Raritan Copper Works (2 wells)
19. Roessler & Hasslacher Chemical Company
20. General Cable Company
21. Puritan Dairy
22. Bona Fide Mills
25. National Fireproofing Company
26. Furman observation well
27 to 37 (inclusive) and 39 Observation wells
50. Clover Green Dairies

(22)

It will be noted that the pumpage from the wells of the three Duhernal companies accounts for the major part of the total pumpage. In recent years the well at the Perth Amboy Water Works has been operated only when it has not been possible to obtain enough water from the Old Bridge sand. In general, the fluctuations of the water level in the various wells, except the Fischer well, correspond with the total rate of pumping. The pumpage north of the Raritan River is fairly constant and does not affect appreciably the trend of the line for total pumpage. The observation wells are all south of the river.

The fluctuations of the Fischer well are believed to be due entirely to variations in precipitation and to other natural causes. It will be noted that the Runyon well fluctuates more widely in response to the pumpage at the Perth Amboy Water Works than do the other wells, and that the Hercules and duPont wells are more responsive to changes in the Duhernal pumpage than are the other wells. The pumpage was higher and the water levels were lower during 1935, 1936 and 1937 than at any other time in the period shown. This is due partly to increased demand from most of the wells tapping the sand, and partly to the fact that the wells at the plant of the National Lead Company were put into operation during 1935. The decrease in pumpage in 1938 was due to conservation measures at the plants of the three Duhernal companies, and to the fact that the summer of 1938 was relatively wet and it was not necessary to operate the deep well at the Perth Amboy Water Works. In 1939 the new Duhernal supply south of Old Bridge was put into operation and the decreased pumpage since that time has been due largely to the fact that a considerable portion of the water used by the Duhernal companies has been taken from this source.

In general, the effect on the water levels in the wells of a given rate of pumpage was about the same both before and after the three years of excessively high pumping. There have, of course, been some changes due to the fact that the construction of the National Lead Company wells in 1935 and the use of the Schweitzer well in 1941 and 1942 have changed the distribution of the pumpage in the area somewhat, but on the whole comparable rates of pumpage in the early 1930's and in the early 1940's have produced comparable water levels in the wells. There is no indication from this diagram that the rates at which the water has been pumped from the Farrington sand have produced any excessive drawdowns in the observation wells. If the rate of pumping had been greater than the capacity of the sand to transmit water from the intake area, a progressive lowering of the water level would have occurred. Even in 1935, 1936 and 1937, when the rate of pumping was about 13 million gallons daily for several months and approached

14 million gallons daily for a few months, the lowering of the water level does not appear to have been out of proportion to the rate of pumping. It may be concluded, therefore, from the study of this diagram, that the capacity of the Farrington sand to transmit water is greater than any rate at which it has been pumped up to the present time.

Salt-Water Intrusion

The factor that appears most likely to limit the safe yield of the Farrington sand, at least in the area within a few miles of the Raritan River, the South River, and the Arthur Kill, appears to be the danger of salt-water intrusion. In fact salt water has already entered the sand both north and south of the Raritan River and advanced for some distance. A considerable number of wells have been more or less severely contaminated.

The areas in which salt-water contamination of the Farrington sand has occurred, a part of the intake area of the sand, and the locations of most of the wells tapping it within the county are shown on figure 12 on page 113. An attempt has been made to indicate the degree of contamination by means of contours enclosing areas in which the salinity of the water is believed to be 10 parts per million or more, and 1,000 parts per million or more. Solid contours are used to indicate fairly well-defined areas of contamination while those less well-defined are indicated by dashed contours. It will be noted that the two largest areas in which contamination has occurred are in the city of Perth Amboy and in the area between the Washington Canal and the well fields at Parlin. Apparently, however, tongues of salt water are reaching out toward the active wells from a number of other points along the tidal streams.

North of Raritan River. A majority of the wells in Perth Amboy and along the north shore of the Raritan River have been contaminated by salt water, apparently drawn in from the river or from the Arthur Kill. In this area it appears probable that most of the wells within a mile or two of these bodies of salt water will ultimately be contaminated by salt water. They may have to be abandoned except as sources of water for cooling or similar purposes.

In most places north of the Raritan River the sand is not as thick as it is south of the river. Nevertheless, very substantial quantities of water have been withdrawn from it in the past, especially in the city of Perth Amboy. Some wells in the city have already been abandoned because of salt water contamination and it is probable that others may soon have to be abandoned. The chloride contents of the water from most of these wells are given in table 9 on page 116. Samples have

(23

been collected from some of the wells in three different years and the table shows the changes that have occurred from time to time. Apparently the only hope for the continued withdrawal of any substantial quantity of fresh water from the Farrington sand north of the Raritan River lies in the construction of relatively shallow wells near the intake area and as far as possible from the streams that contain salt water.

South of Raritan River. As indicated on figure 12 on page 113, salt water is believed to be advancing into the Farrington sand in several localities south of the Raritan River. The largest of these is an area lying between the Washington Canal, the South River, and the well fields at Parlin. This area has been studied in considerable detail, and the intensity and extent of the contamination is fairly well known. Another area that is fairly well delimited is just north of South Amboy. Three other probable areas of salt-water contamination extend from points along the Raritan River toward the well fields at Parlin and South Amboy. These areas have not been defined with the same degree of certainty as the other two, but the available records suggest they may exist.

The Farrington sand south of the Raritan River is protected from the salt water in the river and in the material beneath it by the buried trap ridge that underlies both the river and a strip of land south of it. This buried ridge is a part of the diabase dike that forms the Palisades along the Hudson River, and rises to the surface again to the southwest. In most of Middlesex County it is buried beneath the younger Cretaceous deposits. In pre-Cretaceous times the diabase dike stood as a ridge on the land surface. In the area between Perth Amboy and the town of South River it stood so high that the Farrington sand was not deposited on top of it, except perhaps in some gaps or low places. Numerous test wells have been drilled through the materials overlying the buried ridge and the great majority of them have gone directly from the Woodbridge clay, which overlies the Farrington sand, into the diabase. Unfortunately, however, the ridge was not high enough to furnish much, if any, protection to the Farrington sand in the vicinity of the Washington Canal and the salt water has easy access to the sand in this area. It seems probable, however, that in the other areas of salt-water contamination referred to above, the salt water is advancing across the trap ridge through relatively shallow gaps that do not permit a large flow.

The investigations that preceded the earlier report on the Farrington sand[28] in this area brought out the fact that it is possible for salt water

[28] Barksdale, H. C., Op. Cit., Special Report 7.

to enter the sand in the vicinity of the Washington Canal and probably in the meanders of the South River that extend near the intake area of the sand. It was pointed out that the deepening of the Washington Canal in 1929 provided a ready means of access, whereby the salt water could enter the Farrington sand, and that the heavy rate of pumping at Parlin and elsewhere in the area might have reduced the fresh water head near the canal to such an extent that the intrusion of salt water was possible.

In 1937 and 1938 a series of test wells (Nos. 27, 28, 29, 30, 32, and 33 on figure 12) were drilled, and the analysis of water from them showed that salt water had advanced into the sand in the direction of Parlin to an alarming extent. Chlorides ranging as high as 6,581 parts per million were found in samples from test well 29, and as high as 2,670 in samples from test well 27. Chlorides of almost 300 parts per million were found in samples from test well 32, and test well 33 yielded water containing about 20 parts per million of chloride. All the wells at Parlin were then yielding water containing only 2 to 4 parts per million. The test wells were sampled periodically in order to ascertain what fluctuations of the chloride content might occur and how fast the salt water might be advancing toward the well fields. The chloride contents of these samples are given in table 10 on page 124. The conditions in this area were discussed in a paper published in 1940.[29] They are discussed herein in somewhat more detail in the light of more recent information.

Salinity of Surface Waters

It is probable that the water in the Raritan Bay is usually only a little less salt than normal sea water. Samples of water from the Raritan River estuary opposite Perth Amboy, collected by the New Jersey State Board of Health, were found to contain as much as 19,000 parts per million of chlorides. Up the Raritan River and its branches the chlorides decrease as more and more fresh water is mixed with the water from the bay. In times of flood the larger volume of fresh water entering the estuary of the river forces the salt water out toward the bay, but the continual movement of the tides brings the salt water back into the tidal reaches of these streams as soon as the floods subside. In times of very low flow the salt water probably advances almost to the head of tide in the Raritan River at New Brunswick and, as already noted, appreciably increased chlorides have been

[29] Barksdale, H. C., The Contamination of Ground Water by Salt Water near Parlin, New Jersey. Trans. Am. Geophysical Union, 1940.

(24)

REFERENCE NO. 12

Trube

MIDDLESEX COUNTY 208 AREA-WIDE

WASTE TREATMENT MANAGEMENT PLANNING

TASK 8 - GROUND-WATER ANALYSIS

A. DESCRIPTION OF GROUND-WATER SYSTEM
B. GROUND-WATER POLLUTION SOURCES

prepared by

Geraghty & Miller, Inc.
Consulting Ground-Water Geologists and Hydrologists
44 Sintsink Drive East
Port Washington, New York 11050

November 1976

This report was prepared under a subcontract of the Middlesex 208 Joint Venture in cooperation with the Middlesex County Planning Board. The work was supported by funds provided to the Middlesex County Board of Chosen Freeholders by the U. S. Environmental Protection Agency, Region II, under EPA Grant No. P002102-01-0 as authorized by the Federal Water Pollution Control Act Amendments of 1972, PL 92-500.

HYDROGEOLOGIC FRAMEWORK

The study region is underlain by consolidated and unconsolidated rocks ranging in age from Precambrian to Recent. The northwestern part of the region covering about 160 square miles falls within the Triassic Lowland physiographic region and is underlain by sedimentary and igneous rocks. To the southeast lies the Coastal Plain, a region extending over some 220 square miles. The Coastal Plain is underlain by a thick wedge of sands, gravels, clays, and silts of Cretaceous age. These deposits were laid down by rivers in a deltaic environment and generally thicken in a downdip direction. Younger sediments overlie older sediments in a southeastward direction. The stratigraphic sequence of the various rock units together with their water-bearing properties is shown on Table 1.

Major ground-water reservoirs which are also the most heavily pumped are Triassic sandstones and shales of the Brunswick Formation and the Farrington and Old Bridge Sands of Cretaceous age. Aquifers of lesser importance are the Sayreville Sand, the Englishtown Sand, and the Mount Laurel and Wenonah Sands, all of Cretaceous age and the Pensauken Formation and glacial drift deposits of Pleistocene age.

The Triassic bedrock north of the Raritan River is overlain by sediments of glacial age. East of Plainfield, these deposits consist mostly of glacial till (unsorted sand, gravel, boulders and clay),but to the west and south, permeable glacial outwash deposits are present. The aquifers extend beyond the confines of the study region; the Triassic aquifer northward into Union County and westward across the Millstone River into Somerset County,and the

Table 1 - (Continued)

System	Unit		Lithologic description	Thickness (feet)	Water-bearing characteristics
Cretaceous	Magothy Formation		Fine lignitic sand and black clay	90 - 130	Not important as aquifer. Well yi[...] are low but sufficient for domestic purposes.
Cretaceous	Amboy Stoneware Clay		Gray to black clay with carbonaceous material	0 - 30	Considered to be lower facies of M[...] thy Formation. Confining bed.
Cretaceous	Old Bridge Sand		Fine- to coarse-grained white to yellow sand	20 - 110	Major aquifer tapped by many well[...] Median specific capacity is 20 gpm[...] Transmissivity range 140,000 to 230,000 gpd/ft. Artificially recha[...] in places. Well yields 200 to 1,00[...] gpm.
Cretaceous	South Amboy Fire Clay		Varicolored clay	0 - 35	Confining bed.
Cretaceous	Sayreville Sand		Fine, white micaceous sand	0 - 40	Not continuous. Unimportant as aquifer.
Cretaceous	Woodbridge Clay		Gray clay and clayey sand	50 - 100	Major confining bed overlying Farrington Sand.
Cretaceous	Farrington Sand		Gray to yellow fine- to medium-grained sand. Contains some clay layers.	30 - 150	Major aquifer tapped by many well[...] Median specific capacity is 29 gpm[...] Transmissivity range 50,000 to 150,000 gpd/ft. Well yields 500 t[...] 2,000 gpm.
Cretaceous	Raritan Fire Clay		Varicolored basal clay	0 - 90	Confining bed.
Triassic	Brunswick Formation	Newark Group	Red shale interbedded with siltstone and sandstone	5,000+	Major aquifer north of Raritan Rive[...] Specific capacity is 0.1 to 25 gpm/[...] Transmissivity range 1,000 to 4,0[...] gpd/ft. Well yields 50 to 700 gpm
Triassic	Lockatong Formation	Newark Group	Hard shale and argillite	1,000+	Present only in small areas. Of little importance as aquifers.
Triassic	Stockton Formation	Newark Group	Conglomerate and sandstone	1,000+	Present only in small areas. Of little importance as aquifers.

Coastal Plain aquifers start at the Fall Line and probably continue southward into Mercer and Monmouth Counties. Tracing of the Old Bridge and Farrington Sands beyond the Middlesex County borders is difficult due to complex stratigraphic conditions.

Ground water in the bedrock aquifer is found in fractures and other openings, in contrast to the unconsolidated Coastal Plain deposits where ground water fills the voids between individual grains of the sediment. Both water-table and confined or artesian aquifers are present. The Triassic sandstone and shale and both the Farrington and Old Bridge Sands are under water-table conditions where exposed in the outcrop area. Where overlain by other sediments or zones of low permeability, these aquifers become confined.

Water-table aquifers are recharged by precipitation and sometimes by fluids disposed of in the subsurface, such as septic tank or cesspool effluent. Ordinarily, surface-water bodies act as discharge areas for water-table aquifers; however, in areas of heavy pumping where ground-water levels have fallen below river, stream, or lake levels, the water-table aquifers might receive recharge through surface-water infiltration if geologic conditions are favorable.

The artesian aquifers receive recharge from several sources, namely precipitation on the outcrop area, vertical leakage from confining beds above or below the aquifer, and infiltration of water from rivers or lakes in contact with the aquifer. The impact of man's activities has led to water-level declines and changes in natural head relationships as will be discussed shortly.

On the Coastal Plain, the extensively distributed and thick clay beds such as the Woodbridge, Merchantville and Woodbury act as confining beds and to a large degree prevent downward or upward movement of water in the hydrologic section. Under pre-pumping conditions, the aquifers were brimful with water, discharging excess water to streams that crossed the outcrop area or causing ground-water flow to move downdip through the confined aquifer to discharge points along the Atlantic Ocean. For example, heads in the Farrington Sand at the beginning of exploitation in 1897 were about 30 to 40 feet above land surface in the Perth Amboy well field and the wells flowed. Increased pumpage over the years decreased the head and the present potentiometric surface in the region is about 70 feet below sea level, indicating a historic head decline of roughly 100 feet. No historical decline of the water table in the Old Bridge Sand or Triassic rocks is known in spite of large seasonal water-level variations.

Historical trends of water levels in the Farrington Sand are shown on Figures 1 and 2. These records from U. S. Geological Survey observation wells depict downward trends in the South River, Perth Amboy and Duhernal Sayreville (Dusay) observation wells located in the pumping zones. The Fisher observation well (Figure 1) shows a stable water-level trend; it is located in the recharge area removed from the influence of pumping (locations of all wells are shown on Plate 14). Figures 3 and 4 show the historical record of water-level fluctuation in seven observation wells tapping the Old Bridge Sand (for locations of wells see Plate 13). As shown, water levels in the Duhernal wells declined to below sea level during the drought period 1963-65 but have now recovered to pre-drought elevations. No long-term dewatering of the Old Bridge aquifer is evident.

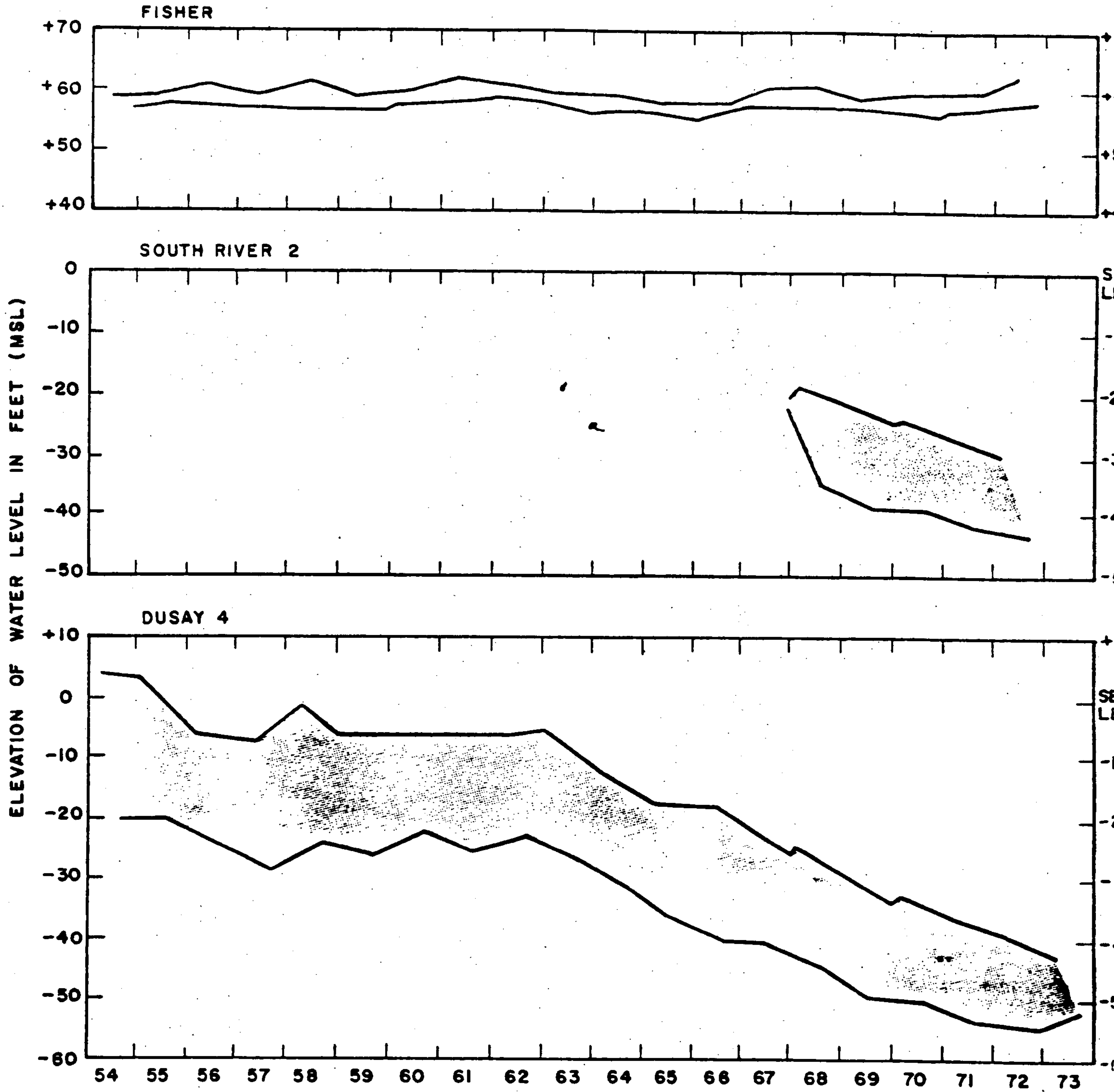


Figure 1 – Yearly high and low water levels in U. S. Geological Survey observation wells tapping the Farrington Sand.

SALT-WATER INTRUSION

Salt-water intrusion in the Middlesex 208 region is limited to the Farrington Sand in the vicinity of the Raritan and South Rivers; no salt-water intrusion has occurred in the Old Bridge Sand. The Farrington Sand occurs stratigraphically between the Raritan Fire Clay and the Woodbridge Clay (see Plate 3 - Cross Section II) and outcrops in a northeast-trending belt both north and south of the Raritan River. Although the outcrop area of this formation is divided by the Raritan River, the Farrington does occur beneath it. A buried northeast-trending Triassic age diabase ridge, 4,000 to 6,000 feet wide, underlies the Farrington Sand in the area of the Raritan River between Sayreville and Perth Amboy (see Plate 8 - Contours on Upper Surface of Bedrock Beneath Coastal Plain). The surface of this buried ridge is highly irregular, but its general topographic expression in upper Cretaceous time had a strong effect on Farrington sedimentation. Many test wells drilled through the materials overlying the ridge have gone directly from the Woodbridge Clay into the diabase and it is apparent that in many places between Sayreville and Perth Amboy, the Farrington Sand was either not deposited on top of this diabase ridge, or else was laid down and subsequently eroded. The sand was deposited in enough places however, so that salt water from the Raritan and South Rivers and the Washington Canal can move across the top of the ridge and into the Farrington Sand south of the Raritan River.

In Special Report 7 3), it was pointed out that deepening of the Washington Canal in 1929 provided easy access for salt water to enter the Farrington Sand. In addition, it was also noted that heavy pumpage centered in the Parlin area and elsewhere might intrusion into the Farrington Sand from both the Raritan River and Arthur Kill. Because of the thinness of the aquifer here and the natural low head, continued pumping in close proximity to these two surface-water bodies will cause additional salt-water intrusion.

No widespread salt-water intrusion problems exist in the Old Bridge Sand. The main reason for this is that while the Old Bridge aquifer is heavily pumped (30 mgd in 1974), most of this pumpage is in the outcrop area where the aquifer is recharged, thereby keeping the water level in the Old Bridge Sand generally above sea level. Also, artificial recharge ponds at the Duhernal Water System and Sayreville and Perth Amboy Water Departments increase the effective ground-water recharge in this area. By maintaining the head above sea level, intrusion of salt water from the surrounding saline and brackish surface-water bodies is prevented.

Furthermore the Old Bridge Sand, unlike the Farrington which underlies the Raritan River, Washington Canal and South River, is exposed to saline surface-water bodies at only two localities. In the general area of the South Amboy well field, the Old Bridge Sand outcrops adjacent to the Raritan Bay and probably underlies it for some distance off shore. Also, downstream of Duhernal Dam the Old Bridge outcrop area is crossed by the South River and two of its tributaries, Deep Run and Tennent Brook. The South River, Deep Run, and Tennent Brook are affected by tides in Raritan Bay. The chloride content of these three streams varies depending on the tidal stage and the ground- and surface-water flow entering the stream, but appreciably increased chloride concentrations have been found in the South River upstream almost as far as Duhernal Dam.

ent. On Triassic areas, infiltration is low and surface runoff quite high, whereas the opposite is true for the sands and gravels of the Coastal Plain. The Coastal Plain area north of the Raritan River was excluded from the water balance as the aquifers there are of little or no importance. In preparing the two water budgets, a number of assumptions were made. Underflow of ground water into the water budget regions was assumed to be equal to underflow out of the region, thus cancelling this component. Also, the hydrologic systems were considered to be in long-term dynamic equilibrium with negligible changes in ground-water storage.

Water-budget analyses of both the Coastal Plain and the Triassic Lowland are given in Table 6. In the overall Coastal Plain water budget, the water input is 400 mgd based on 44 inches of precipitation per year, which is equivalent to roughly 2 mgd per square mile. Half of this quantity, 22 inches or 200 mgd, is lost to the atmosphere by evapotranspiration, and 20 inches or 180 mgd runs off in streams. Evapotranspiration of shallow ground water in swampy areas covering 15 square miles equals 15 mgd and spring flow to salt-water bodies is estimated at 5 mgd.

The ground-water budget for the Coastal Plain shows ground-water recharge of about 140 mgd, which is derived through subtracting direct or storm runoff (estimated at 60 mgd or 15 percent of annual precipitation) and evapotranspiration from precipitation (400 mgd). Outflow of ground-water discharge to streams equals about 13 inches per year or 120 mgd. Evapotranspiration losses of shallow ground water and spring flow total 20 mgd.

In the Triassic Lowland, the overall water budget shows precipitation equaling 340 mgd, based on 44 inches or about 2 mgd per square mile, half of which is lost to evapotranspiration

(9)

Withdrawing large quantities of water in excess of natural replenishment, however, produces a decline in water levels as water is taken from storage, which in turn may lead to salt-water intrusion in coastal zones. As the eastern portion of the Farrington Sand is experiencing large head declines and locally, salt-water intrusion, removing additional ground water from storage within the aquifer in that area would not be recommended. Instead a more widely distributed pumping network might be required to eliminate excessive drawdowns in the coastal zone and to utilize the large ground-water reserves. More detailed recommendations for ground-water management techniques in both the Coastal Plain and Triassic Lowland are given in a later section of the report.

EFFECT OF THE PROPOSED CRAB ISLAND RESERVOIR ON GROUND-WATER SUPPLIES OF THE FARRINGTON AND OLD BRIDGE SANDS

A tidal dam has been proposed on the Raritan River downstream from Crab Island. The proposed reservoir surface would be 7.5 feet above mean sea level. The purpose of the reservoir is for flood protection, water supply, and recreation. The reservoir would prevent salt water from moving with the tides of the Raritan River, Washington Canal, and South River to recharge areas of the aquifers. It would raise fresh-water heads in the aquifers, thereby lowering the potential for salt-water intrusion. It is hoped that the reservoir would act to recharge water to the aquifers in response to ground-water pumpage. Water from the reservoir could also be used for artificial recharge of the aquifers.

The effect of the proposed reservoir on ground-water supplies in both the Farrington and Old Bridge Sands was studied by Remson and Fungaroli [7] of the U.S. Geological Survey

REFERENCE NO. 13

DR. S. OKULEWICZ

Geological Investigations of the Coastal Plain of Southern New Jersey

Part 2:

A. Hydrogeology and the Coastal Plain

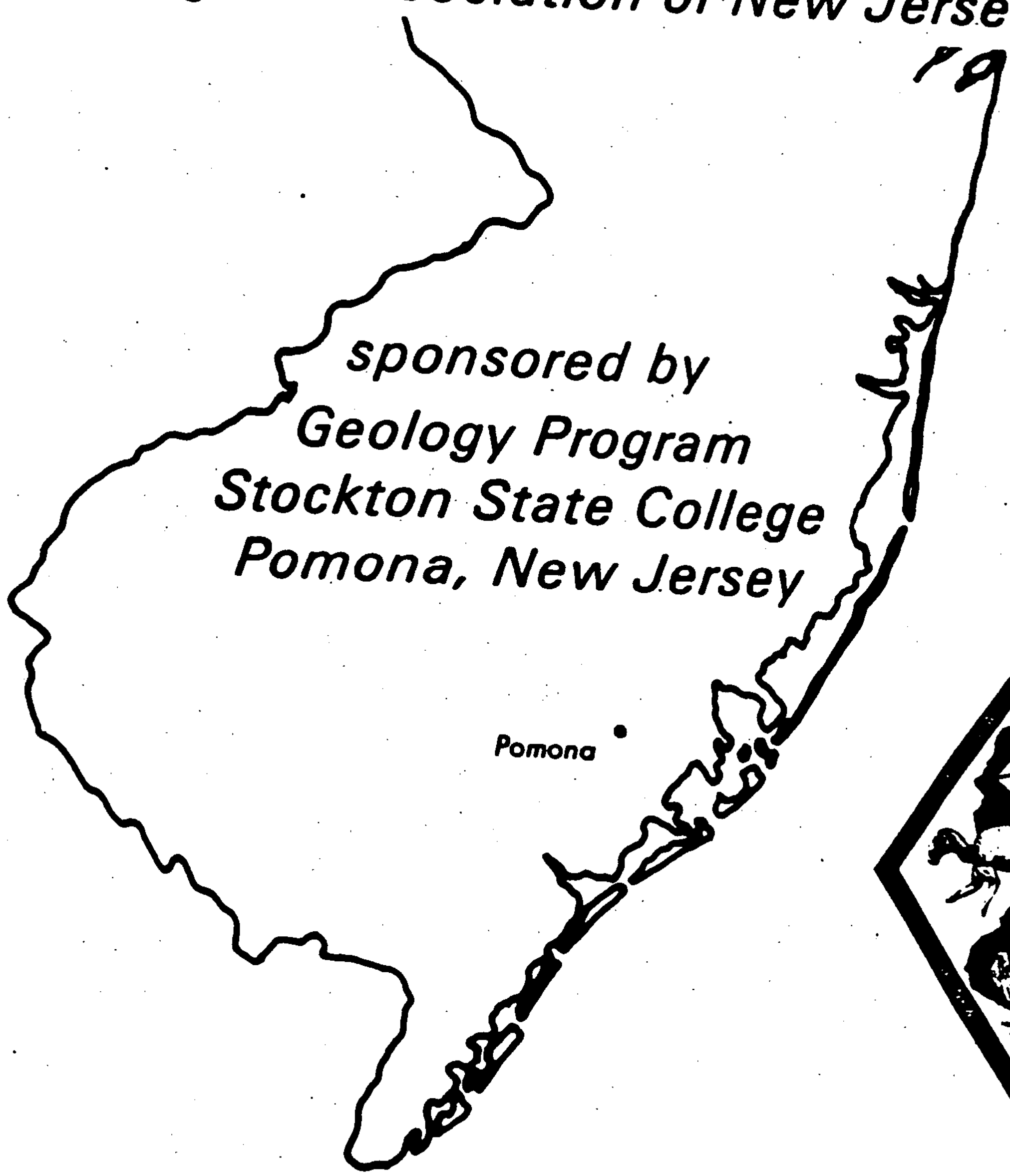
edited by Claude M. Epstein

B. Paleontologic Investigations

edited by Raymond W. Talkington

2nd Annual Meeting of the Geological Association of New Jersey

sponsored by
Geology Program
Stockton State College
Pomona, New Jersey



sand that generally strike northeast-southwest and thicken as a wedge southeasterly from a featheredge at the outcrop to more than 1,000 feet in southeastern Monmouth County (Zapecza, 1984).

The Farrington aquifer, which consists of the Farrington Sand Member of the Raritan Formation, overlies a crystalline rock basement in the western part of the study area and the Raritan Fire Clay downdip of the outcrop area. In areas near its outcrop, the Farrington Sand Member also overlies the diabase Palisades sill (figures 1 and 2). The member consists of sands and gravels with clay lenses. The Farrington aquifer thickens from 50 feet in and near its outcrop to about 100 to 125 feet in the southeastern part of the study area (Zapecza, 1984). In the study area, the aquifer is overlain by the Woodbridge Clay Member of the Raritan Formation. Locally, this micaceous silt and clay confining bed includes sand and clay lenses of the Sayreville Sand and the South Amboy Fire Clay Members of the Raritan Formation (Farlekas, 1979). The confining-bed thickness increases from less than 50 feet in the outcrop area to more than 150 feet farther downdip in this area (Zapecza, 1984).

The Old Bridge aquifer, generally, is equivalent to the Old Bridge Sand Member, the basal unit of the Magothy Formation. Locally, where the South Amboy Fire Clay member of the Raritan Formation is thin or missing, the Old Bridge aquifer may include the Sayreville Sand Member as shown in figure 2 (Farlekas, 1979). The aquifer is composed of medium sands locally interbedded with clayey silts (Farlekas, 1979). From the outcrop, the unit thickens to about 125 feet downdip at a depth of 700 to 800 feet below sea level in the southeastern part of the study area. Localized interbedded sand, silt, and clay sequences pinch out and interfinger with the overlying confining bed downdip (Zapecza, 1984).

The Merchantville-Woodbury confining bed overlies the PRMA system throughout the study area. Zapecza (1984) described it as the most extensive confining bed in the New Jersey Coastal Plain. The confining bed thickness ranges from about 100 feet in the study area to approximately 300 to 350 feet toward the east (Zapecza, 1984).

Detailed discussions of geologic characteristics and stratigraphy of the Raritan and Magothy Formations and overlying Coastal Plain deposits are in Barksdale and others (1943), Gill and Farlekas (1976), and Zapecza (1984).

PREVIOUS INVESTIGATIONS IN THE VICINITY OF SAYREVILLE, AND SOUTH RIVER BOROUGHS, AND THE CITY OF SOUTH AMBOY

Unpublished test-borehole data resulting from commercial development has provided most of the hydrogeologic information in the Boroughs of Sayreville, and South River and the city of South Amboy for this investigation. The earliest information comes from the pits that were dug into the clay beds near the South River and Raritan River. Meredith Johnson compiled U.S. Army Corps of Engineers (USACE) and New Jersey Department of Transportation test borings in the South and Raritan Rivers (M. Johnson, unpublished worksheets on file at NJDEP, 1925-40). Johnson's worksheets show that the Farrington aquifer pinches out against the Palisades diabase sill in some locations near the estuary waterways.

Barksdale and others (1943), reported on the regional hydrogeology and ground-water supply. His report included an areal delineation of the extent of the Palisades sill. Subsequent analysis on the extent and the depth of the sill from borings and well records was done by Steven Whitney of the NJGS (Whitney, S., New Jersey Geological Survey, written commun., 1969). An aeromagnetic survey of this area by the U.S. Geological Survey (1979) may indicate that the sill is present further to the west than previously determined by either Whitney or Barksdale.

Two projects proposed by the USACE in the 1960's concerned the hydrogeology of this area. The first was a proposal to dam the South River and form a freshwater reservoir (U.S. Army Corps of Engineers, 1962). Appel (1962) prepared a preliminary report for this project that included data on the permeability properties and distribution of the alluvium along the South and Raritan Rivers. Another study examined the potential effects of continued dredging of the rivers by the USACE (Appel, U.S. Geological Survey, written commun., 1962). This study shows the extent and location of the Farrington aquifer, and the confining alluvium above and the confining Palisades sill below the aquifer. The study also shows that the areal distribution of the chloride migration pattern is a function of both the sediment permeability beneath the estuary waterways and the irregular aquifer thickness. Table 3 summarizes the hydrogeologic data for this area.

REFERENCE NO. 14

Form DWR-138
11/80

Cc d: 2641334

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES

PERMIT NO. 26-7714

APPLICATION NO.

COUNTY Middlesex

WELL RECORD

1. OWNER STOLT TERMINALS INC. ADDRESS 920 STATE ST.

Owner's Well No. SURFACE ELEVATION ______ Feet (Above mean sea level)

2. LOCATION Lot: IA Block: 425 Municipality: Perth Amboy City

3. DATE COMPLETED 8/20/85 DRILLER Somerville Well Drilling Co.

4. DIAMETER: Top 10 inches Bottom 6 inches TOTAL DEPTH 580 Feet

5. CASING: Type drive Diameter 6 Inches Length 160 Feet

6. SCREEN: Type ______ Size of Opening ______ Diameter ______ Inches Length ______ Feet

Range in Depth { Top ______ Feet, Bottom ______ Feet } Geologic Formation ______

Tail Piece: Diameter ______ Inches Length ______ Feet

7. WELL FLOWS NATURALLY ______ Gallons per minute at ______ Feet above surface

Water rises to ______ Feet above surface

8. RECORD OF TEST: Date 8/20/85 Yield 45 Gallons per minute

Static water level before pumping 50 Feet below surface

Pumping level 460 feet below surface after 8 hours pumping

Drawdown 410 Feet Specific Capacity 2 Gals. per min. per ft. of drawdown

How pumped air How measured weir

Observed effect on nearby wells none

9. PERMANENT PUMPING EQUIPMENT:

Type ______ Mfrs. Name ______

Capacity ______ G.P.M. How Driven ______ H.P. ______ R.P.M. ______

Depth of Pump in well ______ Feet Depth of Footpiece in well ______ Feet

Depth of Air Line in well ______ Feet Type of Meter on Pump ______ Size ______ Inches

10. USED FOR incustrial AMOUNT { Average ______ Gallons Daily, Maximum ______ Gallons Daily }

11. QUALITY OF WATER good Sample: Yes X No ______

Taste none Odor none Color clear Temp. ______ °F.

12. LOG 0-160' sand/clay-160-580'cerintine Are samples available? no

(Give details on back of sheet or on separate sheet. If electric log was made, please furnish copy.)

13. SOURCE OF DATA Somerville Well Drilling Co., Inc.

14. DATA OBTAINED BY same Date 8/20/85

(NOTE: Use other side of this sheet for additional information such as log of materials penetrated, analysis of the water, sketch map, sketch of special casing arrangements, etc.)

ATTACHMENT: C

REFERENCE NO. 15

GROUND-WATER SITE DATA

DATA RELIABILITY (C3) [redacted]
field checked, poor location, minimal data, unchecked

SITE TYPE (C2) [redacted]
collector, drain, excavation, sink-hole, connector well, multiple wells, outcrop, pond, tunnel, well, test hole

DATE OF CONSTRUCTION (C21) [ ] - [ ] - 19[ ]
month day year

USE OF SITE (C23) [redacted]
anode, standby emer. supply, drain, geothermal, seismic, heat reservoir, mine, observation, oil or gas, recharge, repressurize, test, unused, withdrawal, waste, destroyed

SECONDARY USE OF SITE (C301) (SEE USE OF SITE) [ ]

TERTIARY USE OF SITE (C302) (SEE USE OF SITE) [ ]

USE OF WATER (C24)

A	B	C	D	E	F	H	I	J	K	M	N	P	Q	R	S	T	U	Y	Z
air cond.,	bottling,	commercial,	dewater,	power,	fire,	domestic,	irrigation,	industrial (cooling),	mining,	medicinal,	industrial,	public supply,	aquaculture,	recreation,	stock,	institutional,	unused,	desalination	other

SECONDARY USE OF WATER (C25) (SEE USE OF WATER) [ ]

TERTIARY USE OF WATER (C26) (SEE USE OF WATER) [ ]

AQUIFER TYPE (C713)

U	N	C	M	X
unconfined single	unconfined multiple	confined single	confined multiple	mixed

PRIMARY AQUIFER (C714) [ ]

HOLE DEPTH (C27) [ ] . [ ]

WELL DEPTH (C28) [ ] . [ ]

SOURCE OF DEPTH DATA (C29)

A	D	G	L	M	O	R	S	Z
other gov't.,	driller,	geologist,	logs,	memory,	owner,	other reported,	reporting agency,	other

WATER LEVEL (C30) [ ] . [ ]

DATE WATER LEVEL MEASURED (C31) (Mandatory if C30, water level, has a value) [ ] - [ ] - 19[ ]
month day year

METHOD OF WATER-LEVEL MEASUREMENT (C34)

A	B	C	E	G	H	L	M	N	R	S	T	V	Z
airline,	analog,	calibrated airline,	estimated,	pressure gage,	calibrated press. gage,	geophysical logs,	manometer	non-rec. gage,	reported,	steel tape,	electric tape,	calibrated elec. tape,	other

SITE STATUS FOR WATER LEVEL (C37)

D	E	F	G	H	I	J	N	O	P	R	S	T	V	W	X	Z
dry,	recently flowing,	flowing,	nearby flowing,	nearby recently flowing,	injector site,	injector site monitor,	measurement discon.,	obstruction,	pumping,	recently pumped,	nearby pumping,	nearby recently pumped,	foreign substance,	well destroyed,	surface water effects,	other

SOURCE OF WATER-LEVEL DATA (C33)

A	D	G	L	M	O	R	S	Z
other gov't.,	driller,	geologist,	logs,	memory,	owner,	other reported,	reporting agency,	other

---

CONSTRUCTION DATA

RECORD TYPE (C754) [redacted]

RECORD SEQUENCE NO. (C723) [redacted]

DATE OF CONSTRUCTION (C60) [ ] - [ ] - 19[ ]
month day year

NAME OF CONTRACTOR (C63) [ ]

SOURCE OF DATA (C64)

A	D	G	L	M	O	R	S	Z
other gov't.,	driller,	geologist,	logs,	memory,	owner,	other reported,	reporting agency,	other

METHOD OF CONSTRUCTION (C65)

A	B	C	D	H	J	P	R	T	V	W	Z
air-rotary,	bored or augered,	cable tool,	dug,	hydraulic rotary,	jetted,	air percussion,	reverse rotary,	trenching,	driven,	drive wash,	other

TYPE OF FINISH (C66)

C	F	G	H	O	P	S	T	W	X	Z
porous concrete,	gravel w/perf.,	gravel screen,	horiz. gallery,	open end,	perf. or slotted,	screen,	sand point,	walled,	open hole,	other

TYPE OF SEAL (C67)

B	C	G	N	Z
bentonite,	clay,	cement grout,	none,	other

BOTTOM OF SEAL (C68) [ ]

METHOD OF DEVELOPMENT (C69)

A	B	C	J	N	P	S	Z
air-lift pump,	bailed,	compressed air,	jetted,	none,	pumped,	surged,	other

HOURS OF DEVELOPMENT (C70) [ ]

SPECIAL TREATMENT (C71)

C	D	E	F	H	M	Z
chemicals,	dry ice,	explosives,	deflocculent,	hydrofracturing,	mechanical,	other

34	100CNZC	CENOZOIC ERATHEM
34	110QRNR	QUATERNARY SYSTEM
34	111ALVM	HOLOCENE ALLUVIUM
34	111HLCN	HOLOCENE SERIES
34	111HPPM	UNDIFFERENTIATED HOLOCENE,PLEISTOCENE,PLIOCENE,AND MIOCENE
34	111SWMP	SWAMP DEPOSIT
34	112BRDG	BRIDGETON FORMATION
34	112CPMY	CAPE MAY FORMATION
34	112DLTC	DELTAIC SAND FACIES
34	112ESRNC	ESTUARINE CLAY FACIES
34	112ESRNS	ESTUARINE SAND FACIES
34	112GCLK	GLACIAL LAKE DEPOSITS
34	112GKMK	KAME AND KAME TERRACE DEPOSITS
34	112GLCD	GLACIAL DELTA DEPOSITS
34	112HLBC	HOLLY BEACH WATER-BEARING ZONE
34	112MORN	MORAINE
34	112MRIN	MARINE SAND FACIES
34	112PKBG	PENSAUKEN-BRIDGETON FORMATIONS
34	112PLCC	PLEISTOCENE SERIES-COHANSEY SAND
34	112PLSC	PLEISTOCENE SERIES
34	112PNSK	PENSAUKEN FORMATION
34	112SFDF	STRATIFIED DRIFT
34	112TILL	TILL
34	120TRTR	TERTIARY SYSTEM
34	121BCHL	BEACON HILL GRAVEL
34	121CKKD	COHANSEY SAND-KIRKWOOD FORMATION
34	121CNSY	COHANSEY SAND
34	121PCMC	PLIOCENE-MIOCENE SERIES
34	121PLCN	PLIOCENE SERIES
34	122KRKD	KIRKWOOD FORMATION
34	122KRKDL	KIRKWOOD FORMATION,LOWER SAND
34	122KRKDU	KIRKWOOD FORMATION,UPPER SAND
34	122MOCN	MIOCENE SERIES
34	123OLGC	OLIGOCENE SERIES
34	124EOCN	EOCENE SERIES
34	124MNSQ	MANASQUAN FORMATION
34	124MQVC	MANASQUAN-VINCENTOWN FORMATIONS
34	124PNPN	PINEY POINT FORMATION
34	124SKRV	SHARK RIVER MARL
34	125HRRS	HORNERSTOWN SAND
34	125PLCN	PALEOCENE SERIES
34	125VCHR	VINCETOWN FORMATION-HORNERSTOWN SAND
34	125VNCN	VINCENTOWN FORMATION
34	200MSZC	MESOZOIC ERATHEM
34	210CRCS	CRETACEOUS SYSTEM
34	211EGLS	ENGLISHTOWN FORMATION
34	211FRNG	FARRINGTON SAND MEMBER OF RARITAN FORMATION
34	211MCVL	MERCHANTVILLE FORMATION
34	211MGRR	MAGOTHY-RARITAN FORMATIONS
34	211MGTY	MAGOTHY FORMATION
34	211MLRL	MOUNT LAUREL SAND
34	211MLRW	MOUNT LAUREL SAND-WENONAH FORMATION
34	211MRPA	MAGOTHY-RARITAN-POTOMAC AQUIFER SYSTEM, UNDIFFERENTIATED
34	211MRPAL	MAGOTHY-RARITAN-POTOMAC AQUIFER SYSTEM, LOWER AQUIFER
34	211MRPAM	MAGOTHY-RARITAN-POTOMAC AQUIFER SYSTEM, MIDDLE AQUIFER
34	211MRPAU	MAGOTHY-RARITAN-POTOMAC AQUIFER SYSTEM, UPPER AQUIFER
34	211MRSL	MARSHALLTOWN FORMATION
34	211NVSK	NAVESINK FORMATION
34	211ODBG	OLD BRIDGE SAND MEMBER OF MAGOTHY FORMATION
34	211RDBK	RED BANK SAND
34	211RRTN	RARITAN FORMATION
34	211SRVL	SAYREVILLE SAND MEMBER OF RARITAN FORMATION
34	211TNTN	TINTON SAND
34	211WBMV	WOODBURY CLAY-MERCHANTVILLE FORMATION
34	211WDBR	WOODBURY CLAY
34	211WNNH	WENONAH FORMATION
34	217PTMC	POTOMAC GROUP
34	227BNTN	BOONTON FORMATION
34	227BRCK	BRUNSWICK GROUP
34	227BRCKS	BRUNSWICK GROUP SEDIMENTARY
34	227BSLT	BASALT
34	227CGLM	CONGLOMERATE
34	227DIBS	DIABASE
34	227FLVL	FELTVILLE FORMATION

34	227HKMN	HOOK MOUNTAIN BASALT
34	227NWRK	NEWARK SUPERGROUP
34	227ORGM	ORANGE MOUNTAIN BASALT
34	227PRKS	PREAKNESS BASALT
34	227PSSC	PASSAIC FORMATION
34	227TOWC	TOWACO FORMATION
34	230TRSC	TRIASSIC SYSTEM
34	231CGLMU	UNCLASSIFIED CONGLOMERATES
34	231HMCK	HAMMER CREEK FORMATION
34	231LMCG	LIMESTONE CONGLOMERATE
34	231LCKG	LOCKATONG FORMATION
34	231QRCG	QUARTZITE CONGLOMERATE
34	231SCKN	STOCKTON FORMATION
34	300PLZC	PALEOZOIC ERATHEM
34	300WSCK	WISSAHICKON GNEISS
34	324KTTNL	LOWER KITTATINY LIMESTONE
34	324KTTNM	MIDDLE KITTATINY LIMESTONE
34	340DVNN	DEVONIAN SYSTEM
34	341SKMK	SKUNNEMUNK CONGLOMERATE
34	344BLVL	BELLVALE SANDSTONE
34	344CRNL	CORNWALL SHALE
34	344ESPS	ESOPUS FORMATION
34	344KNUS	KANOUSE SANDSTONE
34	344MRCL	MARCELLUS SHALE
34	344ONDG	ONONDAGA LIMESTONE
34	347CMNS	COEYMANS FORMATION
34	347DEPU	DEPUE LIMESTONE MEMBER OF COEYMANS FORMATION
34	347DNVL	DUTTONVILLE MEMBER OF RONDOUT FORMATION
34	347FBKV	FLATBROOKVILLE MEMBER OF NEW SCOTLAND FORMATION
34	347KKBG	KALKBERG LIMESTONE
34	347MNSK	MINISINK LIMESTONE
34	347MPCG	MASHIPACONG MEMBER OF RONDOUT FORMATION
34	347MSKZ	MASKENOZHA MEMBER
34	347NSCD	NEW SCOTLAND FORMATION
34	347ORSK	ORISKANY FORMATION
34	347PREN	PORT EWEN SHALE
34	347PRVL	PETERS VALLEY MEMBER OF COEYMANS FORMATION
34	347RNDT	RONDOUT FORMATION
34	347RVEN	RAVENA MEMBER OF COEYMANS LIMESTONE
34	347SILD	SHAWNEE ISLAND MEMBER OF COEYMANS FORMATION
34	347SMVL	STORMVILLE MEMBER OF COEYMANS FORMATION
34	347TCKR	THACKER MEMBER OF MANLIUS LIMESTONE
34	347WTPR	WHITEPORT DOLOMITE MEMBER OF RANDOUT FORMATION
34	350GRPD	GREEN POND CONGLOMERATE
34	350HGFL	HIGH FALLS FORMATION
34	350SLRN	SILURIAN SYSTEM
34	351BDVL	BOSSARDVILLE LIMESTONE
34	351CVBK	CLOVE BROOK MEMBER OF DECKER FORMATION
34	351DCKR	DECKER FORMATION
34	351LNGD	LONGWOOD SHALE
34	351PXID	POXONO ISLAND FORMATION
34	351WPKC	WALLPACK CENTER MEMBER OF DECKER FORMATION
34	354SNGK	SHAWANGUNK FORMATION
34	360KTTN	KITTATINNY LIMESTONE
34	360ODVC	ORDOVICIAN SYSTEM
34	361BSKL	BUSHKILL MEMBER OF MARTINSBURG SHALE
34	361MRBG	MARTINSBURG SHALE
34	361PAGL	PEN ARGYL MEMBER OF MARTINSBURG SHALE
34	361RMBG	RAMSEYBURG MEMBER OF MARTINSBURG SHALE
34	364JKBG	JACKSONBURG LIMESTONE
34	367EPLR	EPLER FORMATION
34	367KTTNU	UPPER KITTATINY LIMESTONE
34	367RCKB	RICKENBACH DOLOMITE
34	370CMBR	CAMBRIAN SYSTEM
34	371ALNN	ALLENTOWN DOLOMITE
34	374LSVL	LEITHSVILLE FORMATION
34	377HRDS	HARDYSTON QUARTZITE
34	400BLMR	BALTIMORE GNEISS
34	400FRKL	FRANKLIN LIMESTONE
34	400PCMB	PRECAMBRIAN ERATHEM
34	BASEMENT	BASEMENT
34	BEDROCK	BEDROCK

GWSI

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230356	SAYREVILLE W D	SWD F	SAYREVILLE BORO	402614	0741955	28.00	74.0		402614074195501	211ODBG	53.00	74.00	P	W	19590221			230356
230357	SAYREVILLE W D	SWD TEST 4	SAYREVILLE BORO	402616	0742029	20.00	89.0		402616074202901	211ODBG	78.00	89.00	U	T	1963			230357
230358	SAYREVILLE W D	SWD K	SAYREVILLE BORO	402617	0741945	48.00	90.0		402617074194501	211ODBG	70.00	80.00	P	W	19651006			230358
230359	SAYREVILLE W D	SWD D	SAYREVILLE BORO	402618	0741952	29.00	75.0		402618074195201	211ODBG	64.00	75.00	P	W	19580926			230359
230360	SAYREVILLE W D	SWD TEST 2	SAYREVILLE BORO	402618	0741952	50.00	78.0		402618074195202	211ODBG	67.00	78.00	U	T	1963			230360
230361	SAYREVILLE W D	SWD E	SAYREVILLE BORO	402619	0741958	28.00	62.0		402619074195801	211ODBG	39.00	62.00	P	W	1958			230361
230362	PERTH AMBOY WATER DEPARTM	AMBOY 60	SAYREVILLE BORO	402619	0742009	25.00	67.0		402619074200901	211ODBG	52.00	67.00	P	W	19701117			230362
230363	SAYREVILLE W D	TEST 1 1944	SAYREVILLE BORO	402620	0742039	23.00	205		402620074203901	211FRNG	185.00	205.00	U	T	19441025			230363
230364	SAYREVILLE W D	SWD 3	SAYREVILLE BORO	402620	0742124	5	107		402620074212401	211FRNG			U	D	1937			230364
230365	DUHERNAL W CO	DUH SAY 4	SAYREVILLE BORO	402633	0742120	5.70	160		402623074212701	211FRNG	148.00	160.00	U	D	1931			230365
230366	SAYREVILLE W D	SWD L	SAYREVILLE BORO	402624	0741939	63.00	89.0		402624074193901	211ODBG	79.00	89.00	P	W	19651202			230366
230367	SAYREVILLE W D	SWD G	SAYREVILLE BORO	402624	0741944	46.00	87.0		402624074194401	211ODBG	56.00	87.00	P	W	19600323			230367
230368	SAYREVILLE W D	I	SAYREVILLE BORO	402626	0741936	58.00	94.0		402626074193601	211ODBG	83.00	94.00	P	W	1960			230368
230369	SAYREVILLE W D	SWD H	SAYREVILLE BORO	402630	0741949	45.00	83.0		402630074194901	211ODBG	67.00	83.00			19600816			230369
230370	HERCULES POWDER	HERCULES 6	SAYREVILLE BORO	402631	0742053	20.00	194		402631074205301	211FRNG	164.00	194.00	U	W	19460805			230370
230371	HERCULES POWDER	HERCULES 5	SAYREVILLE BORO	402638	0742022	48.00	228		402638074202201	211FRNG	182.00	228.00	U	W	19290319			230371
230372	SAYREVILLE W D	SWD TEST 5	SAYREVILLE BORO	402642	0741940	85.00	108		402642074194001	211ODBG	98.00	108.00	U	T	1963			230372
230373	SAYREVILLE W D	SWD TEST 6	SAYREVILLE BORO	402643	0741932	95.00	106		402643074193201	211ODBG	95.00	106.00	U	T	19630419			230373
230374	SAYREVILLE W D	SWD TEST 7	SAYREVILLE BORO	402647	0741936	110.00	60.0		402647074193601	211ODBG	49.00	60.00	U	T	1963			230374
230375	SAYREVILLE W D	SWD TEST 8	SAYREVILLE BORO	402648	0741930	100.00	128		402648074193001	211FRNG	117.00	128.00	U	T	1963			230375
230376	HERCULES POWDER	HERCULES 3	SAYREVILLE BORO	402649	0742025	40.80	220		402649074202501	211FRNG	180.00	220.00	N	W	19280302			230376
230377	HERCULES POWDER	HERCULES OBS 2	SAYREVILLE BORO	402654	0742043	40.00	223		402654074204301	211FRNG	212.00	223.00	U	D	1954			230377
230378	INSUL - CAUSTIC	1-1958	SAYREVILLE BORO	402654	0742126	20.00	120		402654074212601	211FRNG	110.00	120.00	N	W	1958			230378
230379	DUHERNAL W CO	DUHRNL OBS 40F	SAYREVILLE BORO	402656	0742104	30.00	184		402656074210401	211FRNG			U	Z	19440329			230379
230380	HERCULES POWDER	HERCULES 2	SAYREVILLE BORO	402659	0742020	47.50	237		402659074202001	211FRNG	184.00	237.00	N	W	19271222			230380
230380		HERCULES 2	SAYREVILLE BORO	402659	0742020	47.50	237		402659074202001	211FRNG	181.00	237.00	N	W				230380
230381	PARAGON BRICK COMPANY	PARAGON 1	SAYREVILLE BORO	402701	0742159		103		402701074215901	211FRNG			U	W	1927			230381
230382	E I DUPONT	2	SAYREVILLE BORO	402703	0741859	93.00	118		402703074185901	211FRNG	98.00	118.00	U	Z	19371105			230382
230383	E I DUPONT	8A	SAYREVILLE BORO	402703	0741859	96.56	116		402703074185902	211ODBG	97.00	116.00	N	W	19540811			230383
230384	HERCULES POWDER	HERCULES 1REBT	SAYREVILLE BORO	402705	0742023	54.30	225		402705074202301	211FRNG	170.00	225.00	N	W	19391229			230384
230385	DUHERNAL W CO	DUHRNL OBS 32F	SAYREVILLE BORO	402706	0742130	27.00	125		402706074213001	211FRNG			U	Z				230385
230386	E I DUPONT	6	SAYREVILLE BORO	402701	0741917	102.00	314		402708074192201	211FRNG	253.00	314.00	N	W	19300404			230386
230387	DUHERNAL W CO	DUHRNL OBS 39F	SAYREVILLE BORO	402711	0742045	40.00	193		402711074204501	211FRNG	183.00	193.00	U	U	19430527			230387
230388	DUHERNAL W CO	DUHRNL OBS 59F	SAYREVILLE BORO	402711	0742045	40.00	223		402711074204502	211FRNG	212.00	223.00	U	Z	1934			230388
230389	E I DUPONT	5	SAYREVILLE BORO	402710	0741910	106.92	309		402712074192101	211FRNG	257.00	304.00	N	W	1928			230389
230389		5	SAYREVILLE BORO	402710	0741910	106.92	307		402712074192101	211FRNG	249.00	304.00	N	W				230389
230390	HERCULES POWDER	HERCULES OBS 1	SAYREVILLE BORO	402712	0742045	35.00	198		402712074204501	211FRNG	187.00	198.00	U	D	19530805			230390
230391	HERCULES POWDER	HERCULES 4	SAYREVILLE BORO	402711	0742030	46.70	226		402713074203201	211FRNG	163.00	172.00	U	U	1928			230391
230391		HERCULES 4	SAYREVILLE BORO	402711	0742030	46.70	226		402713074203201	211FRNG	187.00	226.00	U	U				230391
230392	E I DUPONT	1	SAYREVILLE BORO	402716	0741922	101.60	286		402715074192401	211FRNG	237.00	291.00	N	W	1924			230392
230393	E I DUPONT	3	SAYREVILLE BORO	402715	0741932	94.38	284		402715074193201	211FRNG	246.00	285.00	N	W	19250901			230393
230393		3	SAYREVILLE BORO	402715	0741932	94.38	284		402715074193201	211FRNG	244.00	284.00	N	W				230393
230394	E I DUPONT	FARLIN OBS	SAYREVILLE BORO	402715	0741932	90.00	307		402715074193202	211MRPA			U	D				230394
230395	DUHERNAL W CO	DUHRNL OBS 33F	SAYREVILLE BORO	402715	0742050	36.00	175		402715074210201	211FRNG			U	Z	1938			230395
230396	DUHERNAL W CO	DUHRNL OBS 27F	SAYREVILLE BORO	402718	0742213	8.00			402718074221301	211FRNG			U	Z				230396
230397	DUHERNAL W CO	DUHRNL OBS 55F	SAYREVILLE BORO	402728	0742044	70.	189.		402728074204401	211FRNG	169.00	175.00	U	Z	19460524			230397
230397		DUHRNL OBS 55F	SAYREVILLE BORO	402728	0742044	70.	187		402728074204401	211FRNG	185.00	189.00	U	Z				230397
230398	DUHERNAL W CO	DUHRNL OBS 58F	SAYREVILLE BORO	402736	0741949	90.00	255		402741074194901	211FRNG	250.00	255.00	U	Z	19480916			230398
230399	DUHERNAL W CO	DUHRNL OBS 57F	SAYREVILLE BORO	402741	0741958	70.00	240		402741074195801	211FRNG	230.00	240.00	U	Z	19480902			230399
230400	SAYREVILLE W D	R 1973	SAYREVILLE BORO	402745	0741645	100.00	82.0	20.00	402743074162101	211ODBG	57.00	82.00	P	W				230400
230401	SAYREVILLE W D	MORGAN F	SAYREVILLE BORO	402744	0741628	44.00	288		402744074162801	211FRNG	254.00	288.00	P	W	19670609			230401
230402	SAYREVILLE W D	TEST WELL 3-69	SAYREVILLE BORO	402745	0741628	30.00	140		402745074162802	211FRNG	117.00	140.00	U	T	19690718			230402
230403	SAYREVILLE W D	SWD 9-1973	SAYREVILLE BORO	402745	0741631	40.00	136		402745074163101	211ODBG	78.00	98.00	P	W	19730126			230403
230403		SWD 9-1973	SAYREVILLE BORO	402745	0741631	40.00	136		402745074163101	211ODBG	116.00	136.00	P	W				230403
230404	SAYREVILLE W D	MORGAN OBS 1	SAYREVILLE BORO	402745	0741645	23.35	248		402736074314501	211FRNG	238.00	248.00	U	D	19660602			230404
230405	G S PARKWAY	CHEESEQUAKE 2	SAYREVILLE BORO	402753	0741711	70.00	107		402753074171101	211MRPA	88.00	107.00	U	Z	19540623			230405
230406	DUHERNAL W CO	DUHRNL OBS 28F	SAYREVILLE BORO	402753	0742218	6.00	50.0		402753074221801	211FRNG			U	Z				230406
230407	G S PARKWAY	CHEESEQUAKE 3	SAYREVILLE BORO	402802	0741627	73.00	122		402754074171401	211MRPA			U	Z	19600712			230407
230408	G S PARKWAY	CHEESEQUAKE 1	SAYREVILLE BORO	402802	0741627	73.00	122		402754074171402	211ODBG	92.00	121.50	U	Z	19690806			230408
230409	DUHERNAL W CO	DUHRNL OBS 36F	SAYREVILLE BORO	402751	0742002	95.00	224		402755074200201	211FRNG	219.00	229.00	U	Z	1941			230409
230410	DUHERNAL W CO	DUHRNL OBS 29F	SAYREVILLE BORO	402813	0742205	10.00	60.0		402813074220501	211FRNG	50.00	60.00	U	Z				230410
230411	SOUTH AMBOY W D	SAWD 8	SAYREVILLE BORO	402822	0741630	10.00	234		402822074163001	211FRNG	209.00	234.00	U	U	19470226	46-00144		230411
230412	SOUTH AMBOY W D	SAWD 5	SAYREVILLE BORO	402823	0741631	10.00	52.0		402823074164101	211ODBG			U	Z	1937			230412
230413	SOUTH AMBOY W D	SAWD 9	SAYREVILLE BORO	402824	0741631	10.00	48.0		402824074163101	211ODBG	25.00	47.00	U	Z	1965			230413
230414	SOUTH AMBOY W D	SAWD 10	SAYREVILLE BORO	402825	0741632	10.00	48.0		402825074163201	211ODBG	38.00	48.00	P	W	19670522	26-04078		230414
230415	NL INDUSTRIES	4	SAYREVILLE BORO	402835	0741815	108.00	251		402831074181501	211FRNG	220.00	251.00	U	W	1952			230415
230416	NJ STEEL & STRC	TEST WELL 2	SAYREVILLE BORO	402834	0741920	10.00	192		402834074192001	211FRNG	168.00	192.00	U	T	1972			230416
230417	NJ STEEL & STRC	TEST WELL 1	SAYREVILLE BORO	402836	0741919	10.00	130		402836074191901	211FRNG	114.00	130.00	U	T	19720414			230417
230418	NL INDUSTRIES	3	SAYREVILLE BORO	402843	0741808	117.00	270		402842074181101	211FRNG	240.00	270.00	U	W	1934			230418
230419	NL INDUSTRIES	2	SAYREVILLE BORO	402854	0741804	104.00	253		402854074180501	211FRNG	220.00	253.00	U	U	1934			230419
230420	NL INDUSTRIES	1-1934	SAYREVILLE BORO	402905	0741800	121.00	266		402905074180001	211FRNG	36.00	66.00	U	Z	19340501			230420
230420		1-1934	SAYREVILLE BORO	402905	0741800	121.00	266		402905074180001	211FRNG	236.00	266.00	U	Z				230420
230421	NL INDUSTRIES	TEST 3	SAYREVILLE BORO	402905	0741800	118.00		10.00	402905074180002	211FRNG			U	Z	19340501		334	230421
230422	DUHERNAL W CO	DUHRNL OBS 35F	SAYREVILLE BORO	402920	0741804	65.00	156		402920074180401	211FRNG			U		19481004			230422
230423	NL INDUSTRIES	CL TEST 1	SAYREVILLE BORO	402943	0741808	30.00	84.0		402942074180901	211FRNG	75.00	84.00	U	T	1956			230423
230424	DUHERNAL W CO	DUHRNL OBS 34F	SAYREVILLE BORO	402945	0741752	16.00	129		402945074175501	211FRNG			U	Z				230424
230425	DUHERNAL W CO	FARLIN 60F	SAYREVILLE BORO	402729	0741937	147.00	288		402958074193801	211FRNG	282.00	288.00	U	D	19660510			230425
230425	E I DUPONT	FARLIN 60F	SAYREVILLE BORO	402729	0741937	147.00	288		402958074193801	211FRNG			U	D				230425
230427	SWAN HILL ICE C	SWAN HILL 1	SOUTH AMBOY CITY	402900	0741644	20.00	52.0		402904074164801	211ODBG	40.00	52.00	U	Z	1922			230427
230428	JERS CENTRAL PL	WERNER STA 5	SOUTH AMBOY CITY	402922	0741658	9	160		402922074165801	211FRNG			U	U	1956			230428
230429	JERS CENTRAL PL	WERNER STA 6	SOUTH AMBOY CITY	402923	0741648	18.00	177		402923074155601	211FRNG	154.00	177.00	U	U	1969			230429
230430	JERS CENTRAL PL	7-1972	SOUTH AMBOY CITY	402923	0741651	12.00	165		402923074165101	211FRNG	135.00	165.00	N	W	19721013			230430
230431	JERS CENTRAL PL	WERNER STA 4	SOUTH AMBOY CITY	402926	0741649	10.00	168		402926074155001	211FRNG	143.00	168.00	U	Z	1952			230431
230432	SOUTH RIVER W D	SRWD 4	SOUTH RIVER BORO	402557	0742138	18.30	182	9.00	402557074213802	211FRNG	149.50	179.50	P	W	19750512	28-08788	207	230432
230432		SRWD 4	SOUTH RIVER BORO	402557	0742138	18.30	182		402557074213802	211FRNG	150.00	180.00	P	W			207	230432
230433	NJ WATER POLICY	SO RIVER 4	SOUTH RIVER BORO	402555	0742133	20.00	33.0		402555074213301	211ODBG	30.00	33.00	U	D	19680126			230433
230434	SOUTH RIVER W D	SRWD 2	SOUTH RIVER BORO	402556	0742141	20.00	198		402556074214101	211FRNG	173.00	198.00	P	W	1952	28-00332		230434
230435	SOUTH RIVER W D	INFIL GALLERY	SOUTH RIVER BORO	402556	0742141	20.00	15.0		402556074214102	211ODBG			P	W	1916			230435
230436	SOUTH RIVER W D	SRWD 1	SOUTH RIVER BORO	402557	0742138	20.00	193		402557074213801	211FRNG	163.00	192.00	P	W	1922			230436
230437	SOUTH RIVER W D	SRWD 3	SOUTH RIVER BORO	402559	0742142	19.70	198		402559074214201	211FRNG	162.00	198.00	U	Z	19670502	28-06069		230437

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230438	SOUTH RIVER BOR	SRWD	SOUTH RIVER BORO	402559	0742142	19.70	187	12.00	402559074214202	211FRNG	132.00	182.00	P	W	197707	28-09722	202	230438
230438	SOUTH RIVER W D	SRWD	SOUTH RIVER BORO	402559	0742142	19.70	187		402559074214202	211FRNG			P	W			202	230438
230439	SOUTH RIVER W D	SRWD 2 OBS	SOUTH RIVER BORO	402633	0742200	20.69	126		402633074220001	211FRNG	121.00	126.00	U	D	1967			230439
230440	CHADWICK, THOMAS	1	SOUTH RIVER BORO	402648	0742226	15.00	195		402647074222701	211FRNG			N	W	1922			230440
230440	B&E CAB CO	1	SOUTH RIVER BORO	402648	0742226	15.00	195		402647074222701	211FRNG			N	W				230440
230440	HODGES BUS CO	1	SOUTH RIVER BORO	402648	0742226	15.00	195		402647074222701	211FRNG			N	W				230440
230441	HERBERT SAND CO	HSC 3	SOUTH RIVER BORO	402742	0742309	6.40	52.0		402748074230601	211FRNG	49.00	52.00	U	T	1964			230441
230442	SPOTSWOOD WD	SWWD 3	SPOTSWOOD BORO	402252	0742432	30.00	91.0		402252074243201	211ODBG	63.50	77.92	P	W	197306	28-07828		230442
230442		SWWD 3	SPOTSWOOD BORO	402252	0742432	30.00	91.0		402252074243201	211ODBG	64.00	78.00	P	W				230442
230443	SPOTSWOOD WD	TEST WELL 3	SPOTSWOOD BORO	402329	0742318	20.00	79.0		402318074233301	211ODBG	59.00	79.00	U	T	19700727			230443
230444	DUHERNAL W CO	DUHERNAL 9	SPOTSWOOD BORO	402326	0742313	14.34	72.0		402326074231301	211ODBG	62.00	72.00	U	D	19381026			230444
230445	SPOTSWOOD WD	TW 4F-76	SPOTSWOOD BORO	402328	0742318	12.00	264	12.00	402328074231801	211FRNG	195.00	215.00	U	T	197607		328	230445
230445		TW 4F-76	SPOTSWOOD BORO	402328	0742318	12.00	264		402328074231801	211FRNG	219.00	239.00	U	T			328	230445
230445		TW 4F-76	SPOTSWOOD BORO	402328	0742318	12.00	264		402328074231801	211FRNG	254.00	264.00	U	T			328	230445
230446	DUHERNAL W CO	DUHRNL OBS 50F	SPOTSWOOD BORO	402328	0742331	20.00	280		402328074233101	211FRNG	244.00	251.00	U	Z	19460427			230446
230446		DUHRNL OBS 50F	SPOTSWOOD BORO	402328	0742331	20.00	280		402328074233101	211FRNG	273.00	280.00	U	Z				230446
230447	SPOTSWOOD WD	SWWD 1	SPOTSWOOD BORO	402329	0742319	18.00	85.0		402329074231901	211ODBG	64.00	85.00	P	W	19561126	28-02172		230447
230448	SPOTSWOOD WD	SWWD 2	SPOTSWOOD BORO	402330	0742316	20.00	83.0		402330074231601	211ODBG	62.00	83.00	U	Z	19571122	28-02173		230448
230449	DUHERNAL W CO	DUHERNAL 17	SPOTSWOOD BORO	402352	0742250		60.0		402352074225001	211MRPA			U	D				230449
230450	DUHERNAL W CO	DUHERNL OBS 11	SPOTSWOOD BORO	402400	0742245		69.0		402400074224501	211MRPA			U	D				230450
230451	SCHWEITZER, P J	5	SPOTSWOOD BORO	402401	0742243	36.00	89.0		402401074224301	211ODBG	69.00	89.00	N	W	19410826			230451
230452	SCHWEITZER, P J	8	SPOTSWOOD BORO	402401	0742243	25.00	276		402401074224302	211FRNG	226.00	276.00	N	W	19470522			230452
230453	SCHWEITZER, P J	1	SPOTSWOOD BORO	402404	0742235	30.00	285		402404074223501	211FRNG	265.00	285.00	U	Z	19290121			230453
230454	SCHWEITZER, P J	3	SPOTSWOOD BORO	402404	0742235		70.0		402404074223503	211ODBG	49.00	74.00	N	W	19290321			230454
230455	SCHWEITZER, P J	2	SPOTSWOOD BORO	402404	0742235		61.0		402404074223504	211ODBG	36.00	61.00	N	W	19290129			230455
230456	SCHWEITZER, P J	1R	SPOTSWOOD BORO	402404	0742235	21.00	275		402404074223505	211FRNG	235.00	275.00	N	W	19560606			230456
230457	SCHWEITZER, P J	6	SPOTSWOOD BORO	402405	0742247	30.00	73.0		402405074224701	211ODBG	53.00	73.00	N	W	19421024			230457
230458	SCHWEITZER, P J	7	SPOTSWOOD BORO	402408	0742243	33.00	76.0		402408074224301	211ODBG	61.00	76.00	N	W	19460625			230458
230459	SCHWEITZER, P J	3R	SPOTSWOOD BORO	402412	0742248	35.00	68.0		402412074224801	211ODBG	58.00	68.00	N	W	19600218			230459
230460	SCHWEITZER, P J	9	SPOTSWOOD BORO	402421	0742230	25.00	63.0		402421074223001	211ODBG	53.00	63.00	N	W	19610324			230460
230461	SCHWEITZER, P J	4R	SPOTSWOOD BORO	402421	0742233	35.00	59.0		402421074223301	211ODBG	49.00	59.00	N	W	19610216			230461
230462	UNION CARBIDE	CARBIDE 1	WOODBRIDGE TWP	403043	0741842	15.00	57.0		403043074184201	211FRNG	47.00	57.00	N	W	19650928			230462
230463	HEYDEN CHEM CO	1	WOODBRIDGE TWP	403050	0741916	10.00	190		403050074191601	231BRCK			N	W	1934			230463
230464	HEYDEN CHEM CO	3-1934	WOODBRIDGE TWP	403050	0741916	10.00	50.0		403050074191602	211FRNG			N	W	1934			230464
230465	HEYDEN CHEM CO	4-1934	WOODBRIDGE TWP	403050	0741916	10.00	45.0		403050074191603	211FRNG			N	W	1934			230465
230466	CATALIN CORP	1	WOODBRIDGE TWP	403051	0741931	10.00	38.0		403051074193101	211FRNG			N	W	1940			230466
230467	CATALIN CORP	2	WOODBRIDGE TWP	403051	0741931	10.00	32.0		403051074193102	211FRNG			N	W	1940			230467
230468	CATALIN CORP	3	WOODBRIDGE TWP	403051	0741931	10.00	42.0		403051074193103	211FRNG			N	W	1940			230468
230469	CATALIN CORP	4	WOODBRIDGE TWP	403051	0741931	10.00	31.0		403051074193104	211FRNG			N	W	1940			230469
230470	CATALIN CORP	5	WOODBRIDGE TWP	403051	0741931	10.00	34.0		403051074193105	211FRNG			N	W	1944			230470
230471	CATALIN CORP	6	WOODBRIDGE TWP	403051	0741931	10.00	210		403051074193106	231BRCK			N	W	1944			230471
230472	AMERICAN CYANAMID CO	CYAN WDBRG F3	WOODBRIDGE TWP	403233	0741620	15.00	80.0		403233074162001	211MRPA			U	Z	19470131			230472
230473	SWIFT AND CO	SWIFT 1	WOODBRIDGE TWP	403233	0741633	30.00	59.0		403233074163301	211FRNG	39.00	59.00	N	W	19551125			230473
230473	HAAGEN DAZS INC	SWIFT 1	WOODBRIDGE TWP	403233	0741633	30.00	59.0		403233074163301	211FRNG			N	W				230473
230474	SWIFT AND CO	RECHARGE WELL	WOODBRIDGE TWP	403233	0741633		61.0		403233074163302	211FRNG	41.00	61.00	N	W	19551210			230474
230474	HAAGEN DAZS INC	RECHARGE WELL	WOODBRIDGE TWP	403233	0741633		61.0		403233074163302	211FRNG			N	W				230474
230475	CLOVER GREEN DY	DAIRY WELL	WOODBRIDGE TWP	403233	0741647	45.00	68.0		403233074164701	211FRNG			N	W	1936			230475
230476	NJ WOOD FINISH	NJ WOOD 3	WOODBRIDGE TWP	403234	0741633	35.00	77.0		403234074163301	211FRNG			N	W	19420227			230476
230476	ALPHA ASSOC	NJ WOOD 3	WOODBRIDGE TWP	403234	0741633	35.00	77.0		403234074163301	211FRNG			N	W				230476
230477	VULCAN DETINING	1	WOODBRIDGE TWP	403236	0741543	10.00	10.0		403236074154301	211FRNG			N	W	1913			230477
230478	AMERICAN CYANAMID CO	CYANAMID 2A	WOODBRIDGE TWP	403236	0741616	9.00	60.0		403236074161601	211FRNG	45.00	60.00	N	W	19581215	26-01889		230478
230479	AMERICAN CYANAMID CO	CYAN WDBRG F2	WOODBRIDGE TWP	403236	0741616	15.00	74.0		403236074161602	211FRNG	44.00	54.00	U	Z	19470129			230479
230479		CYAN WDBRG F2	WOODBRIDGE TWP	403236	0741616	15.00	74.0		403236074161602	211FRNG	46.00	56.00	U	Z				230479
230479		CYAN WDBRG F2	WOODBRIDGE TWP	403236	0741616	15.00	74.0		403236074161602	211FRNG	63.00	73.00	U	Z				230479
230479		CYAN WDBRG F2	WOODBRIDGE TWP	403236	0741616	15.00	74.0		403236074161602	211FRNG	64.00	75.00	U	Z				230479
230480	AMERICAN CYANAMID CO	CYAN WDBRG F1	WOODBRIDGE TWP	403236	0741617	10.00	28.0		403236074161701	211FRNG			U	Z	1910			230480
230481	VULCAN DETINING	2	WOODBRIDGE TWP	403238	0741542	10.00	15.0		403238074154201	211FRNG			N	W	1927			230481
230482	AMERICAN CYANAMID CO	TEST 1	WOODBRIDGE TWP	403242	0741617	11.00	76.0		403242074161701	211FRNG	44.00	54.00	U	D				230482
230482		TEST 1	WOODBRIDGE TWP	403242	0741617	11.00	76.0		403242074161701	211FRNG	64.00	76.00	U	D				230482
230483	PORT READING CO	READING 18	WOODBRIDGE TWP	403406	0741431	10.00	45.0		403406074143101	211FRNG			N	W				230483
230484	PORT READING CO	READING 6	WOODBRIDGE TWP	403406	0741433	10.00	42.0		403406074143301	211FRNG			N	W				230484
230485	PORT READING CO	READING 14	WOODBRIDGE TWP	403406	0741441	10.00	30.0		403406074144101	211FRNG			N	W				230485
230486	PORT READING CO	READING 15	WOODBRIDGE TWP	403407	0741436	10.00	42.0		403407074143601	211FRNG			N	W				230486
230487	READING RAILROAD	2	WOODBRIDGE TWP	403407	0741447	20.00	41.0		403407074144701	211FRNG	31.00	41.00	N	W	19480512			230487
230488	READING RAILROAD	1	WOODBRIDGE TWP	403407	0741447	20.00	41.0		403407074144702	211FRNG	31.00	41.00	N	W	19480422			230488
230489	PORT READING CO	READING 17	WOODBRIDGE TWP	403408	0741433	10.00	43.0		403408074143301	211FRNG			N	W				230489
230490	MONROE TWP MUA	6-R	MONROE TWP	401925	0742620	167.00	325	20.00	401925074262002	211ODBG	287.00	325.00	I	W	197410	28-08490	329	230490
230491	ELIZABETHTOWN W	PLAINSBORO 3	PLAINSBORO TWP	401937	0743431	70.00	67.0	0.00	401937074343101	211FRNG	47.00	67.00	P	W	197803	28-09278	77.0	230491
230492	BASF-WYANDOTTE	BASF 3	SOUTH BRUNSWICK TWP	402129	0742823	130.00	276	13.00	402129074282302	211FRNG	230.00	276.00	N	W	19780428		300	230492
230493	SCHWEITZER, P J	10	EAST BRUNSWICK TWP	402410	0742247	5.00	73.0		402410074224701	211ODBG	62.00	72.00	N	W			73.0	230493
230494	SPOTSWOOD WD	SWWD 5	SPOTSWOOD BORO	402329	0742331	23.00	97.0		402338074231501	211ODBG	83.00	97.00	P	W	19780623	28-10465	104	230494
230495	STANLEY CORP RUSSELL	1	WOODBRIDGE TWP	403234	0741630	40.00	80.0		403234074163001	211FRNG			N	W	19680403			230495
230496	FORSGATE INC	MONROE 2	MONROE TWP	402046	0742732	120.00	144		402046074273201	211ODBG	135.00	144.00	H	W	19760224		144	230496
230497	FORSGATE INC	HWH WELL	MONROE TWP	402109	0742747	130.00	114		402109074274701	211ODBG	109.00	114.00	H	W	19750415		115	230497
230498	FORSGATE INC	MONROE 3	MONROE TWP	402054	0742806	140.00	98.0		402054074280601	211ODBG	92.00	98.00	H	W	19760226		99.0	230498
230499	SPOTSWOOD WD	SWWD 4F	SPOTSWOOD BORO	402328	0742318	20.00	287		402328074231802	211FRNG	198.00	282.00	P	W	19770428	28-09559	325	230499
230500	SOUTH BRUNSWICK TOWNSHIP	BROADWAY T	SOUTH BRUNSWICK TWP	402018	0743021	105.00	161		402018074302101	211ODBG	131.00	161.00	U	Z	197807			230500
230501	SOUTH BRUNSWICK TOWNSHIP	DAVID ML T	SOUTH BRUNSWICK TWP	402347	0742726	100.00	170		402347074272601	211MRPA	150.00	170.00	U	Z	197807			230501
230502	ANHEUSER BUSCH	BUSCH 7	EAST BRUNSWICK TWP	402432	0742215	38.00	260	26.00	402432074221501	211FRNG	210.00	260.00	J	W	19780321	28-10174	310	230502
230503	EONAITIS, PETER	EONAITIS 1	MONROE TWP	401938	0742404	140.00	440	8.08	401938074240401	211FRNG	410.00	440.00	I	W	19640930		440	230503
230504	FORSGATE INC	I-IRR	MONROE TWP	402047	0742820	141.00	340		402047074282001	211FRNG	288.00	308.00	I	W	19720717		365	230504
230504		I-IRR	MONROE TWP	402047	0742820	141.00	340		402047074282001	211FRNG	325.00	340.00	I	W			365	230504
230505	DYAL, LEROY	DYAL2-1967	CRANBURY TWP	401920	0743247	90.00	82.0		401920074324701	211ODBG	20.00	30.00	I	W	19670609		82.0	230505
230505		DYAL2-1967	CRANBURY TWP	401920	0743247	90.00	82.0		401920074324701	211ODBG	40.00	80.00	I	W			82.0	230505
230506	SMITH, LAWRENCE LAWRENCE	3-1958	EAST BRUNSWICK TWP	402358	0742612	120.00	223		402401074261201	211FRNG	213.00	223.00	I	W	19580711		255	230506
230507	DANSER, FRANK	UNUSED DOM	CRANBURY TWP	401801	0743154	105.00	130		401801074315401	211ODBG			U	U				230507
230508	DANSER, FRANK	DOMEST-73	CRANBURY TWP	401801	0743154	105.00	90.0		401801074315402	211ODBG			H	W	1973			230508
230509	NAPPI TRUCK CO	MARZ MASON	OLD BRIDGE TWP	402530	0741602	130.00	136		402530074160202	211ODBG	126.00	136.00	U	Z	19610818			230509
230510	IBM CORP	GW 20	SOUTH BRUNSWICK TWP	402234	0743114	118.70	65.0	0.00	402234074311401	211FRNG	30.00	65.00	U	O	19780223	28-10269	66.5	230510
230511	IBM CORP	S BRUNSWICK TWP	SOUTH BRUNSWICK TWP	402232	0743114	117.70	95.0		402234074311402	211FRNG	65.00	95.00	N	W				230511

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230512	ERDMAN, W	E BRUNSWICK TWP	EAST BRUNSWICK TWP	402531	0742822	85.00			402531074282201	211FRNG			H	W				230512
230513	WILLIAMS, BOB	E BRUNSWICK TWP	EAST BRUNSWICK TWP	402357	0742632	95.00	20.0		402357074263202	211FRNG			S	W				230513
230514	HERBERT SAND CO	E BRUNSWICK TWP	EAST BRUNSWICK TWP	402755	0742258	4.70	35.0	6.00	402755074225801	211FRNG	25.00	35.00	N	W	19760820		40.0	230514
230515	RAAB, GEORGE	E BRUNSWICK TWP	EAST BRUNSWICK TWP	402425	0742520	109.00			402425074252001	211DDBG			I	W				230515
230516	NOVAK	HULSART	OLD BRIDGE TWP	402123	0741849	110.06	19.0		402122074184601	211EGLS	0.00	19.00	U	D				230516
230517	KAISER AG CHEM	MONROE TWP	MONROE TWP	401923	0742830	120.00	196		401923074283001	211DDBG	165.00	196.00	N	W			300	230517
230519	COMPUTER SYSTEMS	NJE-AIR CONDITID	SOUTH BRUNSWICK TWP	402155	0743213	80	347	12	402209074313401	231SCKN	205.00	347.00	A	W	19600217	28-03746	347	230519
230519	NJE CORP	NJE-AIR CONDITID	SOUTH BRUNSWICK TWP	402155	0743213	80	347		402209074313401	231SCKN			A	W			347	230519
230520	BOYKO, OLLIE	1	PLAINSBORO TWP	402044	0743342	80.00	73.0	6.00	402044074334201	211FRNG	68.00	73.00	H	W	19761019	28-09369	75.0	230520
230521	COLUMBIAN CARBN	COLUMBIAN 1	PLAINSBORO TWP	402023	0743740	80.00	300		402023074374001	231LCKG			N	W		48-00030		230521
230522	SCHWEITZER, P J	11	SPOTSWOOD BORO	402413	0742241	25.00	63.0	24.00	402348074230201	211DDBG	53.00	63.00	N	W	19781014		68.0	230522
230523	STANLEY CORP	2	PERTH AMBOY CITY	403229	0741635	15.0	61.5	14.00	403217074164101	211FRNG	46.50	61.50	N	W	19770616		62.0	230523
230524	BIRD & SONS	2	PERTH AMBOY CITY	403212	0741619	20.00	67.0	12.00	403212074161901	211FRNG	57.00	67.00	N	W	19791008	26-04798	67.0	230524
230525	FORRESTAL LABS	7	PLAINSBORO TWP	402050	0743608	100.00	449		402050074360801	231BRCK				W				230525
230526	DOW JONES CO	DOW JONES 1-FIRE	SOUTH BRUNSWICK TWP	402218	0743512	80.00	505	14	402207074351301	231LCKG	37	505	U	W	19620424	28-04393	505	230526
230526		DOW JONES 1-FIRE	SOUTH BRUNSWICK TWP	402218	0743512	80.00	505	10	402207074351301	231LCKG			U	W			505	230526
230527	COLUMBIAN CARBN	10-1962	SOUTH BRUNSWICK TWP	402302	0743342	80.00	705	10.00	402302074334201	231BRCK	23.00	702.00	N	W	19510210	28-00222	705	230527
230528	GULF OIL CO	ABAN	SOUTH BRUNSWICK TWP	402447	0743020	95.00	220.		402447074302001	211MRPA			U	U				230528
230529	ROMATOWSKI, C	GAS LITE RES	EAST BRUNSWICK TWP	402448	0742730	90.00			402451074272801	211FRNG-			U	W			274	230529
230529	KOBE JAPANESE REST	GAS LITE RES	EAST BRUNSWICK TWP	402448	0742730	90.00			402451074272801	211FRNG			U	W			274	230529
230530	BRUNSWICKTWN WC	BWC 8	SOUTH BRUNSWICK TWP	402518	0743309	180.00	805	12.00	402518074330901	231BRCK	32.00	805.00	P	W	19591202		805	230530
230531	BRUNSWK RUBBER	2-1961	SOUTH BRUNSWICK TWP	402526	0743129	125.00	257	8	402522074313001	231BRCK	42	257	N	W	19610621		257	230531
230532	BRUNSWICKTWN WC	BWC 9	SOUTH BRUNSWICK TWP	402526	0743414	140.00	486.	12.00	402526074341401	231BRCK	59.00	486.00	P	W	19600208		486	230532
230533	FLAGPOST INN	1	SOUTH BRUNSWICK TWP	402528	0743138	130.00	400		402528074313801	231BRCK			H	W				230533
230534	PERTH AMBOY WATER DEPARTM	OLD DEEP 8	OLD BRIDGE TWP	402536	0742018	10.00			402536074201802	211DDBG			P	W			96.0	230534
230535	BRUNSWICKTWN WC	BWC 7	SOUTH BRUNSWICK TWP	402547	0743305	170.00	703	12.00	402547074330501	231BRCK	34.00	703.00	P	W	19590820		703	230535
230536	JOHNSON & JOHNSON CO	WATER TANK	NORTH BRUNSWICK TWP	402620	0743015	100.00			402620074301501	231BRCK			N	W			296	230536
230537	BAHATTA BUILDER	HOUSE WELL	MILLTOWN BORO	402645	0742620	65.00	300		402645074262001	231BRCK			H	W				230537
230538	E I DUPONT	2-DDS	SAYREVILLE BORO	402734	0741925	130.00	146		402734074192501	211DDBG			U	D				230538
230539	RODIE RUBBER CO	1	NEW BRUNSWICK CITY	402820	0742647	120.00	225		402820074264701	211MRPA			N	W				230539
230540	JOHNSON & JOHNSON CO	1	NORTH BRUNSWICK TWP	403000	0742644	40.00	601		403000074264401	231BRCK			N	W				230540
230541	SHELL OIL CO	44	WOODBRIDGE TWP	403231	0741518	17.00	36.0		403231074151801	211FRNG			N	W				230541
230542	SHELL OIL CO	2(28)	WOODBRIDGE TWP	403232	0741522	5.00	22.0		403232074152201	211FRNG			N	W				230542
230543	SHELL OIL CO	5(S2)	WOODBRIDGE TWP	403242	0741526	24.76	42.0		403242074152301	211FRNG			U	D				230543
230544	SHELL OIL CO	4(S1)	WOODBRIDGE TWP	403242	0741531	20.00	28.5		403243074152801	211FRNG			U	Z				230544
230545	SHELL OIL CO	5	WOODBRIDGE TWP	403243	0741533	20.00	44.5		403243074153301	211FRNG			N	W				230545
230546	SHELL OIL CO	9	WOODBRIDGE TWP	403249	0741538	22.00	43.0		403249074153801	211FRNG			N	W				230546
230547	SHELL OIL CO	3	WOODBRIDGE TWP	403250	0741534	26.00	43.0		403250074153401	211FRNG			U	D				230547
230548	SHELL OIL CO	8(R7)	WOODBRIDGE TWP	403257	0741539	16.92	36.0		403257074153901	211FRNG			U	D				230548
230549	SAYREVILLE W D	SWD R	SAYREVILLE BORO	402745	0741645	23.00	111	0.00	402746074314503	211DDBG	70.00	111,00	P	W	19800501	29-10500	137	230549
230550	A C PRINTING CO	5	DUNELLEN BORO	403537	0742720	60.00	325	12.00	403537074272001	231BRCK			C	W	19500831		326	230550
230551	SOUTH RIVER W D	SRWD 6	SOUTH RIVER BORO	402548	0742155	47.00	213	20.00	402557074212501	211FRNG	155.00	208.00	P	W	198003	28-11524	217	230551
230552	SOUTH BRUNSWICK MUA	15	SOUTH BRUNSWICK TWP	402018	0743021	105.00	166	32.00	402018074302102	211FRNG	116.00	126.00	P	W	19790501		184	230552
230552		15	SOUTH BRUNSWICK TWP	402018	0743021	105.00	166		402018074302102	211FRNG	146.00	166.00	P	W			184	230552
230553	MONROE TWP MUA	TEST 16	MONROE TWP	401950	0742750	125.00		9.00	401950074275001	211FRNG			U	Z	19800717		464	230553
230554	SAYREVILLE W D	SWD S	SAYREVILLE BORO	402745	0741645	100.00	286	20.00	402738074165901	211FRNG	213.00	286.00	P	W	19800421		309	230554
230555	MONROE TWP MUA	TEST 17	MONROE TWP	402010	0742811	135.00	205	20.00	401958074281901	211DDBG	168.00	200.00	P	W	19800725	28-11720	385	230555
230556	MONROE TWP MUA	TW-16A	MONROE TWP	401950	0742721	137.00	215	9.00	401950074272101	211DDBG	160.00	178.00	U	Z	19801009	28-11719	444	230556
230556		TW-16A	MONROE TWP	401950	0742721	137.00	215		401950074272101	211DDBG	188.00	215.00	U	Z			444	230556
230557	SOUTH AMBOY W D	SAWD 7A	SAYREVILLE BORO	402820	0741629	20.00	58.0	20.00	392833074163701	211DDBG	48.00	58.00	P	W	19790921	26-04812	58.0	230557
230558	FUTZ, STEPHEN	1	WOODBRIDGE TWP	403220	0741820		302		403220074182001	231BRCK			I	W	19541127			230558
230559	SECURITY STEEL	1	WOODBRIDGE TWP	403420	0741633		614		403420074163301	231BRCK			N	W				230559
230560	NATIONAL VARNISH	1	WOODBRIDGE TWP	403553	0741527		405		403553074152701	231BRCK			N	W				230560
230561	HOME FOR DIAB VETS	1	EDISON TWP	403313	0741607		614		403313074160701	231BRCK								230561
230562	NEW DOVER CHURCH	1	EDISON TWP	403500	0742033		111		403500074203301	231BRCK								230562
230563	PERTH AMBOY WATER DEPARTM	1	OLD BRIDGE TWP	402527	0742007		260		402527074200701	211FRNG			U	W				230563
230564	SOUTH BRUNSWICK TOWNSHIP	158-1	SOUTH BRUNSWICK TWP	402015	0743018	100.00	164	12.00	402015074301801	211FRNG	134.00	164.00	U	T	19780627	28-10532	196	230564
230565	MONROE TWP MUA	ROSSMORE GC 17	MONROE TWP	401958	0742919	130.00	197	0.00	401958074281902	211DDBG	165.00	197.00	P	W	19800814		383	230565
230566	STAUFFER CHEM	D-2	SOUTH BRUNSWICK TWP	402129	0742901	124.10	225	0.00	402129074290102	211FRNG	122.00	225.00	U	D	19820302	28-12856	239	230566
230567	MONROE TWP MUA	MTMUA 16A	MONROE TWP	401950	0742750	137.00	244	0.00	401950074275002	211DDBG	163.00	171.00	P	W	19830707	28-13397	250	230567
230567		MTMUA 16A	MONROE TWP	401950	0742750	137.00	244		401950074275002	211DDBG	181.00	187.00	P	W			250	230567
230567		MTMUA 16A	MONROE TWP	401950	0742750	137.00	244		401950074275002	211DDBG	193.00	213.00	P	W			250	230567
230567		MTMUA 16A	MONROE TWP	401950	0742750	137.00	244		401950074275002	211DDBG	234.00	244.00	P	W			250	230567
230568	SCHWEITZER, P J	12	SPOTSWOOD BORO	402410	0742231	25.00	280	0.00	402410074223101	211FRNG	210.00	280.00	N	W	19830217	28-12880	289	230568
230569	SAYREVILLE W D	SWD T	SAYREVILLE BORO	402738	0741700	90.00	137	0.00	402738074170001	211DDBG	102.00	132.00	P	W	19820325	29-11861	163	230569
230570	PERTH AMBOY WATER DEPARTM	PERTH AMBOY 6	OLD BRIDGE TWP	402538	0741950	15.00	80.0	0.00	402538074195001	211DDBG	60.00	80.00	P	W	19821108	29-12351	86.0	230570
230571	PERTH AMBOY WATER DEPARTM	PERTH AMBOY 7	OLD BRIDGE TWP	402531	0741932	15.00	82.0	0.00	402528074193801	211DDBG	67.00	82.00	P	W	19830328	29-12352	90.0	230571
230573	CIRAKY, NICHOLAS	CIRAKY 1	WOODBRIDGE TWP	403207	0741817	150.00	123	0.00	403207074181701	211FRNG			H	W	19650825	26-03264	123	230573
230574	POWESKA, FRANK	POWESKA 1	SAYREVILLE BORO	402737	0741736	100.00	135	0.00	402737074173601	211FRNG	125.00	135.00	I	W	19710602	26-04398	140	230574
230575	MCKEON, JOHN	MCKEON 1	SOUTH AMBOY CITY	402925	0741704	15.00	133	0.00	402925074170401	211FRNG	127.00	133.00	H	W	19751015	26-04635	138	230575
230576	SPINELLO CONST CO	SPINELLO 1	SOUTH AMBOY CITY	402933	0741718	30.00	165	0.00	402933074171801	211DDBG			U	Z		26-04710	165	230576
230577	CHEVRON OIL CO	SB-13A	PERTH AMBOY CITY	403210	0741520	6.80	57.0	7.88	403210074152001	211FRNG	37.00	57.00	U	D	19811105	26-05321	61.0	230577
230578	CHEVRON OIL CO	E15A	WOODBRIDGE TWP	403236	0741543	5.00	64.2	7.88	403236074154302	211FRNG	44.20	64.20	U	D	19811113	26-05324	75.5	230578
230580	PERTH AMBOY WATER DEPARTM	OBS 1	OLD BRIDGE TWP	402517	0742050	20.00	62.0	0.00	402517074205001	211DDBG	57.00	62.00	U	Z	19541220	28-01524	85.0	230580
230581	PARLIN SUPPLY CO	1	SAYREVILLE BORO	402734	0742037	80.00	44.0	0.00	402734074203701	211DDBG	24.00	44.00	I	W	19740601	29-08423	70.0	230581
230582	MIDD CO UTIL AUTH	MADISON CONNET	OLD BRIDGE TWP	402505	0742129	15.00	61.0	6.00	402505074212901	211DDBG	56.00	61.00	Z	W	19780901	28-10495	85.0	230582
230583	AIR PRODUCTS	AIR PRODUCTS 1	SOUTH BRUNSWICK TWP	402154	0742931	105.00	172	0.00	402154074293101	211FRNG	152.00	172.00	N	W	19780824	28-10515	175	230583
230584	TOWN & COUNTRY METAL	GAM CHOY 1	MONROE TWP	401610	0742624	125.00	240	0.00	401610074262401	211DDBG	230.00	240.00	F	W	19780904	28-10626	240	230584
230585	CHIRLIAN, PAUL	DEEPWELL	EAST BRUNSWICK TWP	402450	0742330	120.00	248	0.00	402450074233001	211FRNG	238.00	248.00	Z	W	19801111	28-11899	248	230585
230586	FRETINICH, MICHAEL	2	CRANBURY TWP	401943	0742926	110.00	170	0.00	401943074292601	211DDBG	80.00	170.00	I	W	19810620	28-12332	177	230586
230587	KOSMO, JOSEPH	KOSMO 1	OLD BRIDGE TWP	402205	0742123	90.00	166	0.00	402205074212301	211DDBG	160.00	166.00	H	W	19811119	28-12534	185	230587
230588	STAUFFER CHEM	D-1	SOUTH BRUNSWICK TWP	402120	0742859	127.00	238	0.00	402120074285901	211FRNG	198.00	238.00	U	D	19820323	28-12855	239	230588
230589	STAUFFER CHEM	D-3	SOUTH BRUNSWICK TWP	402129	0742854	124.50	229	0.00	402129074285401	211FRNG	129.00	229.00	U	D	19820315	28-12857	229	230589
230590	E I DUPONT	LAYNE 57 OBS	SAYREVILLE BORO	402721	0741957	90.00	79.0	0.00	402721074195701	211DDBG	74.00	79.00	U	D	19550505	29-01391	126	230590
230591	E I DUPONT	LAYNE 58 OBS	SAYREVILLE BORO	402655	0741916	85.00	92.7	0.00	402655074191601	211DDBG	88.70	92.70	U	D	19550513	29-01390	126	230591
230592	E I DUPONT	LAYNE 59 3 OBS	SAYREVILLE BORO	402659	0741910	80.00	98.0	0.00	402659074191001	211DDBG	94.00	98.00	U	D	19550804	29-01593	113	230592
230593	OLD BRIDGE DEV CORP	SS2	OLD BRIDGE TWP	402158	0741910	95.00	307	0.00	402158074191001	211DDBG	273.00	278.00	U	D	19810518	29-11116	355	230593
230593		SS2	OLD BRIDGE TWP	402158	0741910	95.00	307		402158074191001	211DDBG	302.00	307.00	U	D			355	230593
230594	OLD BRIDGE DEV CORP	PW-81 TW1	OLD BRIDGE TWP	402157	0741911	95.00	315	0.00	402157074191101	211DDBG	275.00	315.00	U	D	19810701	29-11122	355	230594
230595	OLD BRIDGE DEV CORP	SS4	OLD BRIDGE TWP	402153	0741915	105.00	290	0.00	402153074191501	211DDBG	285.00	290.00	U	D	19810701	29-11118	298	230595

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230771	SCHARF, STEVEN	SCHARF 1	MONROE TWP	401718	0742449	110.00	320	4.00	401718074244901	211ODBG	310.00	320.00	H	W	19821123	28-13112	330	230771
230772	KOKOSA, GEORGE	KOKOSA 1	MONROE TWP	402036	0742706	145.00	150	0.00	402036074270601	211ODBG	147.00	150.00	H	W	19560824	28-01994	151	230772
230773	TEE-N-JAY FARM	T-N-J 1	MONROE TWP	401942	0742232	90.00	295	0.00	401942074223201	211ODBG	285.00	295.00	U	W	19731201	28-08150	295	230773
230774	RESNICK, LEWIS	RESNICK 1	MONROE TWP	401623	0742819	110.00	215	0.00	401623074281901	211ODBG	205.00	215.00	H	W	19810530	28-12288	215	230774
230775	SEPTAK, JOHN J	SEPTAK 1	MONROE TWP	401717	0742721	120.00	190	0.00	401717074272101	211ODBG	182.00	190.00	H	W	19791019	28-11436	190	230775
230776	SIMONSON BROS	HOUSE WELL	PLAINSBORO TWP	402047	0743329	80.00	70.0	0.00	402047074332901	211FRNG	65.00	70.00	H	W	19850731	28-15632	70.0	230776
230777	CHOU (SHADOW OAKS)	CHOU 1	CRANBURY TWP	401748	0743208	100.00	88.0	0.00	401748074320801	211ODBG	80.00	88.00	H	W	19810603	28-11996	88.0	230777
230778	FINN, WILLIAM	FINN 1	CRANBURY TWP	401834	0743311	100.00	130	0.00	401834074331101	211FRNG	122.00	130.00	H	W	19830624	28-13514	130	230778
230779	BERESFORD, JAMES	THRIFT STORE	CRANBURY TWP	401813	0743043	120.00	120	0.00	401813074304301	211ODBG	110.00	120.00	C	W	19750402	28-08750	120	230779
230780	ZAITZ, MAX (HIRSCH)	ZAITZ 1	CRANBURY TWP	401826	0743330	100.00	90.0	0.00	401826074333001	211FRNG	85.00	90.00	H	W	19690115	28-06575	90.0	230780
230781	JOCAMA CONST CO	OLD BRIDGE TWP	OLD BRIDGE TWP	402225	0741821	60.00	235	0.00	401821074222501	211ODBG	225.00	235.00	H	W	19800828	28-11788	235	230781
230782	OLD BRIDGE MUA	OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337	0.00	402353074205601	211FRNG	230.00	245.00	P	W	19840801	28-14095	345	230782
230782		OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337		402353074205601	211FRNG	255.00	265.00	P	W			345	230782
230782		OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337		402353074205601	211FRNG	272.00	302.00	P	W			345	230782
230782		OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337		402353074205601	211FRNG	312.00	317.00	P	W			345	230782
230782		OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337		402353074205601	211FRNG	322.00	327.00	P	W			345	230782
230782		OLD BRIDGE 12	OLD BRIDGE TWP	402353	0742056	30.00	337		402353074205601	211FRNG	330.00	337.00	P	W			345	230782
230783	OLD BRIDGE PARKS&REC	SOCCER ASSN 1	OLD BRIDGE TWP	402327	0741620	90.00	265	0.00	402302074162001	211ODBG	245.00	265.00	I	W	19830518	29-12817	265	230783
230784	NAVEDO, JOE	NAVEDO 1	OLD BRIDGE TWP	402327	0742054	30.00	69.0	0.00	402327074205401	211ODBG	63.00	69.00	H	W	19820701	28-13023	70.0	230784
230785	SKISTIMAS, CHARLES	FEROSA 1	EAST BRUNSWICK TWP	402358	0742518	140.00	121	0.00	402358074251801	211ODBG	116.00	121.00	H	W	19741101	28-08649	124	230785
230786	HOSTETLER, HENRY	HOLETELER 1	PLAINSBORO TWP	401919	0743403	100.00	63.0	0.00	401919074340301	211FRNG	55.00	63.00	H	W	19791120	28-11501	63.0	230786
230787	ELY, JOHN	ELY 1	SOUTH BRUNSWICK TWP	402128	0743055	100.00	110	0.00	402128074305501	211FRNG	100.00	110.00	H	W	19810807	23-12434	120	230787
230788	EAST BRUNSWICK TWP	OBS WELL 7	EAST BRUNSWICK TWP	402430	0742552	95	132.75		402430074255201	211FRNG	126.75	132.75	U	Z	19751016	28-08850	160	230788
230789	EAST BRUNSWICK TWP	OBS WELL 6	EAST BRUNSWICK TWP	402416	0742553	130	276.25		402416074255301	211FRNG	212.25	217.25	U	Z	19751002	28-08812	289	230789
230789		OBS WELL 6	EAST BRUNSWICK TWP	402416	0742553	130	276.25		402416074255301	211FRNG	271.25	276.25	U	Z			289	230789
230790	US GEOLOGICAL SURVEY	S. RIVER HIGH	SOUTH RIVER BORO	402627	0742247	75		6.25	402627074224701				U	T	19850905	28-15614	147	230790
230791	US GEOLOGICAL SURVEY	LINPRO	PLAINSBORO TWP	401940	0743353	80		6.25	401940074335301				U	T	19850912	28-15615	150	230791
230792	PRINCETON UNIVERSITY	TEST WELL 1	PLAINSBORO TWP	402059	0743601	97.6	60.0		402058074360101	231SCKN	31.0	60.0	U	D	19851201	28-16112	60.0	230792
230793	PRINCETON UNIVERSITY	TEST WELL 2	PLAINSBORO TWP	402100	0743601	97.7	68.0		402059074360101	231SCKN	31.0	68.0	U	D	19851201	28-16113	68.0	230793
230794	PRINCETON UNIVERSITY	TEST WELL 3	PLAINSBORO TWP	402100	0743559	95.9	81.0		402058074360001	231SCKN	30.0	81.0	U	D	19851201	28-16114	81.0	230794
230795	PRINCETON UNIVERSITY	TEST WELL 4	PLAINSBORO TWP	402100	0743559	96.7	120.0		402058074360002	231SCKN	100.0	120.0	U	D	19851201	28-16115	120.0	230795
230796	PRINCETON UNIVERSITY	TEST WELL 5	PLAINSBORO TWP	402058	0743559	96.7	60.0		402058074355901	231SCKN	20	60.0	U	D	19851201	28-16116	60.0	230796
230797	PRINCETON UNIVERSITY	TEST WELL 6	PLAINSBORO TWP	402100	0743557	95.9	73.0		402059074355701	231SCKN	26	73	U	D	19851201	28-16117	73.0	230797
230798	PRINCETON UNIVERSITY	TEST WELL 7	PLAINSBORO TWP	402100	0743600	93.4	85.0		402059074360001	231SCKN	41.0	85.0	U	D	19851201	28-16118	85.0	230798
230799	PRINCETON UNIVERSITY	TEST WELL 8	PLAINSBORO TWP	402100	0743558	93.8	75.0		402059074355801	231SCKN	30	75.0	U	D	19851201	28-16119	75.0	230799
230800	PRINCETON UNIVERSITY	TEST WELL 9	PLAINSBORO TWP	402058	0743559	96.8	110.0		402058074355902	231SCKN	90.0	110.0	U	D	19860201	28-16120	110.0	230800
230801	PRINCETON UNIVERSITY	TEST WELL 10	PLAINSBORO TWP	402100	0743601	97.1	125.0		402059074360102	231SCKN	100.0	125.0	U	D	19860201	28-16251	125.0	230801
230802	BREESE	BREESE 1	SOUTH BRUNSWICK TWP	402323	0742838	100.	122.	8.5	402323074283801	211FRNG	112.	122.	H	W	19810122	28-12037	126.	230802
230803	GABOURY	GABOURY 1	MONROE TWP	402224	0742500	40.	60.	4.	402224074250001	211ODBG	50.	60.	H	W	19801101	28-14176	60.	230803
230804	MIDDLESEX COUNTY UTILITIE	R-01	WOODBRIDGE TWP	402945	0741937	3.4			402945074193701					T	19670000		36.5	230804
230805	MIDDLESEX COUNTY UTILITIE	R-02	WOODBRIDGE TWP	402948	0741939	4.4			402948074193901					T	19670000		31.5	230805
230806	MIDDLESEX COUNTY UTILITIE	WOODBRIDGE TWP		402952	0741939	3.5			402952074193901					T	19670000		31.5	230806
230807	MIDDLESEX COUNTY UTILITIE	R-04	WOODBRIDGE TWP	402957	0741933	5.0			402957074193301					T	19670000		26.5	230807
230808	MIDDLESEX COUNTY UTILITIE	R-05	WOODBRIDGE TWP	403008	0741919	2.8			403008074191901					T	19670000		31.5	230808
230809	MIDDLESEX COUNTY UTILITIE	R-06	WOODBRIDGE TWP	403012	0741913	4.4			403012074191301					T	19670000		26.5	230809
230810	MIDDLESEX COUNTY UTILITIE	R-08	WOODBRIDGE TWP	402946	0741935	-16.3			402946074193501					T	19670000		36.	230810
230811	MIDDLESEX COUNTY UTILITIE	R-09	WOODBRIDGE TWP	402936	0741928	4.4			402936074192801				U	T	19670000		38.5	230811
230812	MIDDLESEX COUNTY UTILITIE	R-10	SAYREVILLE BORO	402922	0741918	-4.			402922074191801					T	19670000		38.	230812
230813	MIDDLESEX COUNTY UTILITIE	R-11	SAYPEVILLE BORO	402919	0741916	-8.1			402919074191601					T	19670000		46.0	230813
230814	TRANSCONTINENTAL GAS PIPE	TC-243	OLD BRIDGE TWP	402803	0741405	0.0			402803074140501				U	T	19650715		29.1	230814
230815	TITANIUM PIGMENT CO.	TP-T01B	WOODBRIDGE TWP	403034	0741728	0.0			403034074172801				U	T	19360707		44.	230815
230816	TITANIUM PIGMENT CO.	TP-T02B	WOODBRIDGE TWP	403039	0741808	0.0			403039074180801				U	T	19360709		50.	230816
230817	TITANIUM PIGMENT CO.	TP-T03B	WOODBRIDGE TWP	403029	0741838	0.0			403029074183801				U	T	19360710		75.	230817
230818	TITANIUM PIGMENT CO.	TP-T04	WOODBRIDGE TWP	403029	0741827	0.0			403029074182701				U	T	19360711		59.5	230818
230819	TITANIUM PIGMENT CO.	TP-T05B	WOODBRIDGE TWP	403022	0741843	0.0			403022074184301				U	T	19360713		70.	230819
230820	TITANIUM PIGMENT CO.	TP-T06	WOODBRIDGE TWP	403021	0741838	0.0			403021074183801				U	T	19360713		52.	230820
230821	TITANIUM PIGMENT CO.	TP-T07	WOODBRIDGE TWP	403020	0741844	0.0			403020074184401				U	T	19360713		50.	230821
230822	TITANIUM PIGMENT CO.	TP-T08B	WOODBRIDGE TWP	403019	0741840	0.0			403019074184001				U	T	19360714		71.	230822
230823	TITANIUM PIGMENT CO.	TP-T09	WOODBRIDGE TWP	403018	0741845	0.0			403018074184501				U	T	19360714		55.5	230823
230824	TITANIUM PIGMENT CO.	TP-T10	SAYREVILLE BORO	403017	0741841	0.0			403017074184101				U	T	19360715		52.5	230824
230825	TITANIUM PIGMENT CO.	TP-T11B	SAYREVILLE BORO	403016	0741845	0.0			403016074184501				U	T	19360715		57.	230825
230826	TITANIUM PIGMENT CO.	TP-T12	SAYREVILLE BORO	403014	0741842	0.0			403014074184201				U	T	19360715		51.	230826
230827	TITANIUM PIGMENT CO.	TP-T13	SAYREVILLE BORO	403013	0741847	0.0			403013074184701				U	T	19360716		48.75	230827
230828	TITANIUM PIGMENT CO.	TP-T14	SAYREVILLE BORO	403010	0741844	0.0			403010074184401				U	T	19360716		57.5	230828
230829	TITANIUM PIGMENT CO.	TP-T15	SAYREVILLE BORO	403008	0741845	0.0			403008074184501				U	T	19360716		53.	230829
230830	TITANIUM PIGMENT CO.	TP-T16	SAYREVILLE BORO	403007	0741850	0.0			403007074185001				U	T	19360717		41.	230830
230831	TITANIUM PIGMENT CO.	TP-T17	SAYREVILLE BORO	403005	0741846	0.0			403005074184601				U	T	19360717		55.	230831
230832	TITANIUM PIGMENT CO.	TP-T18	SAYREVILLE BORO	403005	0741851	0.0			403005074185101				U	T	19360719		52.5	230832
230833	TITANIUM PIGMENT CO.	TP-T19B	SAYREVILLE BORO	403002	0741848	0.0			403002074184801						19360717			230833
230834	TITANIUM PIGMENT CO.	TP-T20	SAYREVILLE BORO	403003	0741852	0.0			403003074185201				U	T	19360724		61.5	230834
230835	TITANIUM PIGMENT CO.	TP-T21	SAYREVILLE BORO	403000	0741849	0.0			403000074184901				U	T	19360721		59.	230835
230836	TITANIUM PIGMENT CO.	TP-T22	SAYREVILLE BORO	403001	0741853	0.0			403001074185301				U	T	19360723		46.5	230836
230837	TITANIUM PIGMENT CO.	TP-T23	SAYREVILLE BORO	402959	0741847	0.0			402959074184701				U	T	19360721		49.	230837
230838	TITANIUM PIGMENT CO.	TP-T24	SAYREVILLE BORO	402958	0741849	0.0			402958074184901				U	T	19360722		44.	230838
230839	TITANIUM PIGMENT CO.	TP-T25	SAYREVILLE BORO	402958	0741854	0.0			402958074185401				U	T	19360723		52.	230839
230840	TITANIUM PIGMENT CO.	TP-T26	SAYREVILLE BORO	402957	0741850	0.0			402957074185001				U	T	19360722		41.	230840
230841	TITANIUM PIGMENT CO.	TP-T27	SAYREVILLE BORO	402956	0741855	0.0			402956074185501				U	T	19360723		37.	230841
230842	TITANIUM PIGMENT CO.	TP-T28	SAYREVILLE BORO	402953	0741852	0.0			402953074185201				U	T	19360723		39.	230842
230843	TITANIUM PIGMENT CO.	TP-T30	WOODBRIDGE TWP	403027	0741833	0.0			403027074183301				U	T	19360720		70.	230843
230844	TITANIUM PIGMENT CO.	TP-T31	WOODBRIDGE TWP	403026	0741831	0.0			403026074183101				U	T	19360720		63.	230844
230845	TITANIUM PIGMENT CO.	TP-T32	SAYREVILLE BORO	403024	0741830	0.0			403024074183001				U	T	19360721		53.	230845
230846	US ARMY CORPS OF ENGINEER	DH-R-1	EDISON TWP	402913	0742030	8.0			402913074203001				U	T	19650700		63.7	230846
230847	US ARMY CORPS OF ENGINEER	DH-R-2	EDISON TWP	402905	0742028	-2.5			402905074202801				U	T	19650700		61.	230847
230848	US ARMY CORPS OF ENGINEER	DH-R-3	SAYREVILLE BORO	402858	0742024	.0.0			402858074202401				U	T	19650700		67.	230848
230849	US ARMY CORPS OF ENGINEER	DH-R-4	SAYREVILLE BORO	402854	0742024	-2.5			402854074202401				U	T	19650700		64.8	230849
230850	US ARMY CORPS OF ENGINEER	DH-R-5	SAYREVILLE BORO	402846	0742020	5.8			402846074202001				U	T	19650700		82.	230850
230851	US ARMY CORPS OF ENGINEER	DH-R-6	WOODBRIDGE TWP	402945	0741939	7.0			402945074193901				U	T	19650700		30.	230851
230852	US ARMY CORPS OF ENGINEER	DH-20E	SAYREVILLE BORO	402804	0742240	5.6			402804074224001				U	T			56.	230852
230853	US ARMY CORPS OF ENGINEER	DH-21E	SAYREVILLE BORO	402813	0742232	5.6			402813074223201				U	T			56.	230853
230854	US ARMY CORPS OF ENGINEER	DH-22F	SAYREVILLE BORO	402816	0742221	5.6			402816074222101				U	T			56.	230854

UNIQUE ID	SITE	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL	W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230855	US ARMY CORPS OF ENGINEER	DH-23E	SAYREVILLE BORO	402818	0742208	6.0			402818074220801			U	T			56.	230855
230856	US ARMY CORPS OF ENGINEER	DH-24E	EDISON TWP	402826	0742155	6.0			402826074215501			U	T			56.	230856
230857	US ARMY CORPS OF ENGINEER	DH-25E	EDISON TWP	402832	0742144	6.1			402832074214401			U	T			56.	230857
230858	US ARMY CORPS OF ENGINEER	DH-26E	EDISON TWP	402837	0742133	7.0			402837074213301			U	T			[illegible]	230858
230859	US ARMY CORPS OF ENGINEER	DH-27E	SAYREVILLE BORO	402846	0742115	7.4			402846074211501			U	T				
230860	US ARMY CORPS OF ENGINEER	DH-28E	SAYREVILLE BORO	402855	0742100	7.0			402855074210001			U	T			54.	230860
230861	US ARMY CORPS OF ENGINEER	DH-31F	EDISON TWP	402837	0742138	6.1			402837074213801			U	T			30.	230861
230862	MIDDLESEX COUNTY UTILITIE	0-01	SOUTH AMBOY CITY	402912	0741640	8.4			402912074164001			U	T	19550300		17.	230862
230863	MIDDLESEX COUNTY UTILITIE	0-04	SOUTH AMBOY CITY	402932	0741806	8.9			402932074180601			U	T	19550300		39.	230863
230864	MIDDLESEX COUNTY UTILITIE	0-16	SOUTH AMBOY CITY	402848	0741442	0.0			402848074144201			U	T	19550300		98.	230864
230865	MIDDLESEX COUNTY UTILITIE	0-19	SOUTH AMBOY CITY	402851	0741455	0.0			402851074145501			U	T	19550300		88.	230865
230866	MIDDLESEX COUNTY UTILITIE	0-29	SOUTH AMBOY CITY	402900	0741542	0.0			402900074154201			U	T	19550300		50.	230866
230867	MIDDLESEX COUNTY UTILITIE	0-30	SOUTH AMBOY CITY	402901	0741550	0.0			402901074155001			U	T	19550300		101.	230867
230868	MIDDLESEX COUNTY UTILITIE	0-33	SOUTH AMBOY CITY	402904	0741605	0.0			402904074160501			U	T	19550300		25.	230868
230869	MIDDLESEX COUNTY UTILITIE	0-35	SOUTH AMBOY CITY	402905	0741615	0.0			402905074161501			U	T	19550300		20.	230869
230870	MIDDLESEX COUNTY UTILITIE	0-37	SOUTH AMBOY CITY	402908	0741630	2.7			402908074163001			U	T	19550300		20.5	230870
230871	MIDDLESEX COUNTY UTILITIE	0-43	SOUTH AMBOY CITY	402910	0741643	13.4			402910074164301			U	T	19550300		21.	230871
230872	MIDDLESEX COUNTY UTILITIE	0-50	SOUTH AMBOY CITY	402915	0741654	25.5			402915074165401			U	T	19550300		34.	230872
230873	MIDDLESEX COUNTY UTILITIE	0-54	SOUTH AMBOY CITY	402925	0741740	28.5			402925074174001			U	T	19550300		30.5	230873
230874	MIDDLESEX COUNTY UTILITIE	0-57A	SOUTH AMBOY CITY	402926	0741822	118.			402926074182201			U	T	19550300		110.	230874
230875	MIDDLESEX COUNTY UTILITIE	0-57A6	SOUTH AMBOY CITY	402928	0741816	108.8			402928074181601			U	T	19550300		39.	230875
230876	MIDDLESEX COUNTY UTILITIE	0-58	SOUTH AMBOY CITY	402924	0741828	103.2			402924074182801			U	T	19550300		86.	230876
230877	MIDDLESEX COUNTY UTILITIE	SR-01	SAYREVILLE BORO	402802	0742212	6.0		2.5	402802074221201			U	T	19750314		40.	230877
230878	MIDDLESEX COUNTY UTILITIE	SR-02	SAYREVILLE BORO	402800	0742213	4.9		2.5	402800074221301			U	T	19750314		39.5	230878
230879	MIDDLESEX COUNTY UTILITIE	SR-03	SAYREVILLE BORO	402757	0742216	5.4		2.5	402757074221601			U	T	19750319		31.5	230879
230880	MIDDLESEX COUNTY UTILITIE	SR-04	SAYREVILLE BORO	402753	0742217	6.6		2.5	402753074221701			U	T	19750317		30.	230880
230881	MIDDLESEX COUNTY UTILITIE	SR-05	SAYREVILLE BORO	402748	0742216	3.5		2.5	402748074221601			U	T	19750317		30.	230881
230882	MIDDLESEX COUNTY UTILITIE	SR-06	SAYREVILLE BORO	402743	0742215	3.0		2.5	402743074221501			U	T	19750317		30.	230882
230883	MIDDLESEX COUNTY UTILITIE	SR-07	SAYREVILLE BORO	402739	0742215	3.4		2.5	402739074221501			U	T	19750319		31.5	230883
230884	MIDDLESEX COUNTY UTILITIE	SR-08	SAYREVILLE BORO	402735	0742215	3.6		2.5	402735074221501			U	T	19750319		36.	230884
230885	MIDDLESEX COUNTY UTILITIE	SR-09	SAYREVILLE BORO	402731	0742215	5.		2.5	402731074221501			U	T	19750318		30.	230885
230886	MIDDLESEX COUNTY UTILITIE	SR-10	SAYREVILLE BORO	402727	0742214	5.3		2.5	402727074221401			U	T	19750318		31.5	230886
230887	MIDDLESEX COUNTY UTILITIE	SR-11	SAYREVILLE BORO	402725	0742214	8.6		2.5	402725074221401			U	T	19750318		30.	230887
230888	MIDDLESEX COUNTY UTILITIE	SR-12	SAYREVILLE BORO	402721	0742213	0.		2.5	402721074221301			U	T	19750318		30.	230888
230889	MIDDLESEX COUNTY UTILITIE	SR-13	SAYREVILLE BORO	402719	0742213	10.8		2.5	402719074221301			U	T	19750319		30.	230889
230890	MIDDLESEX COUNTY UTILITIE	SR-14	SAYREVILLE BORO	402717	0742213	8.7		2.5	402717074221301			U	T	19750319		31.5	230890
230891	MIDDLESEX COUNTY UTILITIE	SR-15	SAYREVILLE BORO	402716	0742211	2.4		2.5	402716074221101			U	T	19750319		30.	230891
230892	MIDDLESEX COUNTY UTILITIE	SR-16	SAYREVILLE BORO	402712	0742212	8.0		2.5	402712074221201			U	T	19750319		30.	230892
230893	MIDDLESEX COUNTY UTILITIE	SR-17	SAYREVILLE BORO	402709	0742212	7.2		2.5	402709074221201			U	T	19750321		31.5	230893
230894	MIDDLESEX COUNTY UTILITIE	SR-18	SAYREVILLE BORO	402705	0742209	7.8		2.5	402705074220901			U	T	19750407		32.	230894
230895	MIDDLESEX COUNTY UTILITIE	SR-19	SAYREVILLE BORO	402703	0742206	7.4		2.5	402703074220601			U	T	19750404		32.	230895
230896	MIDDLESEX COUNTY UTILITIE	SR-20	SAYREVILLE BORO	402659	0742201	10.		2.5	402659074220101			U	T	19750321		26.5	230896
230897	MIDDLESEX COUNTY UTILITIE	SR-21	SAYREVILLE BORO	402658	0742159	5.9		2.5	402658074215901			U	T	19750321		26.5	230897
230898	MIDDLESEX COUNTY UTILITIE	SR-23	SAYREVILLE BORO	402652	0742152	8.5		2.5	402652074215201			U	T	19750321		25.	230898
230899	MIDDLESEX COUNTY UTILITIE	SR-24	SAYREVILLE BORO	402651	0742143	8.3		2.5	402651074214301			U	T	19750321		26.5	230899
230900	MIDDLESEX COUNTY UTILITIE	SR-25	SAYREVILLE BORO	402651	0742139	9.2		2.5	402651074213901			U	T	19750320		26.5	230900
230901	MIDDLESEX COUNTY UTILITIE	SR-26	SAYREVILLE BORO	402651	0742132	10.0		2.5	402651074213201			U	T	19750321		32.	230901
230902	MIDDLESEX COUNTY UTILITIE	SR-28	SAYREVILLE BORO	402647	0742129	3.5		2.5	402647074212901			U	T	19750325		26.5	230902
230903	MIDDLESEX COUNTY UTILITIE	SR-30	SAYREVILLE BORO	402642	0742128	5.6		2.5	402642074212801			U	T	19750408		32.	230903
230904	MIDDLESEX COUNTY UTILITIE	SR-31	SAYREVILLE BORO	402628	0742122	9.18		2.5	402628074212201			U	T	19750325		35.	230904
230905	MIDDLESEX COUNTY UTILITIE	SR-32	SAYREVILLE BORO	402623	0742121	9.74		2.5	402623074212101			U	T	19750325		37.	230905
230906	MIDDLESEX COUNTY UTILITIE	SR-34	SAYREVILLE BORO	402614	0742115	7.03		2.5	402614074211501			U	T	19750408		27.	230906
230907	MIDDLESEX COUNTY UTILITIE	SR-35	SAYREVILLE BORO	402608	0742113	8.84		2.5	402608074211301			U	T	19750326		31.5	230907
230908	MIDDLESEX COUNTY UTILITIE	SR-36	SAYREVILLE BORO	402605	0742112	8.22		2.5	402605074211201			U	T	19750326		21.5	230908
230909	MIDDLESEX COUNTY UTILITIE	SR-37	SAYREVILLE BORO	402558	0742108	7.19		2.5	402558074210801			U	T	19750326		27.	230909
230910	MIDDLESEX COUNTY UTILITIE	SR-39	SAYREVILLE BORO	402553	0742107	1.2		2.5	402553074210701			U	T	19750403		43.	230910
230911	MIDDLESEX COUNTY UTILITIE	SR-41	SAYREVILLE BORO	402543	0742108	8.66		2.5	402543074210801			U	T	19750326		22.	230911
230912	MIDDLESEX COUNTY UTILITIE	SR-42	SAYREVILLE BORO	402535	0742110	8.99		2.5	402535074211001			U	T	19750327		22.	230912
230913	MIDDLESEX COUNTY UTILITIE	SR-43	SAYREVILLE BORO	402527	0742111	9.0		2.5	402527074211101			U	T	19750328		27.	230913
230914	MIDDLESEX COUNTY UTILITIE	SR-44	SAYREVILLE BORO	402525	0742112	11.91		2.5	402525074211201			U	T	19750327		21.5	230914
230915	MIDDLESEX COUNTY UTILITIE	SR-46	SAYREVILLE BORO	402519	0742113	7.38		2.5	402519074211301			U	T	19750327		22.5	230915
230916	MIDDLESEX COUNTY UTILITIE	SR-47	SAYREVILLE BORO	402517	0742115	1.3		2.5	402517074211501			U	T	19750401		38.2	230916
230917	MIDDLESEX COUNTY UTILITIE	SR-48	OLD BRIDGE TWP	402516	0742116	3.27		2.5	402516074211601			U	T	19750327		21.5	230917
230918	MIDDLESEX COUNTY UTILITIE	SR-48C	OLD BRIDGE TWP	402514	0742114	2.61		2.5	402514074211401			U	T	19750411		24.	230918
230919	MIDDLESEX COUNTY UTILITIE	SR-52	OLD BRIDGE TWP	402509	0742123	4.0		2.5	402509074212301			U	T	19750411		22.	230919
230920	MIDDLESEX COUNTY UTILITIE	SR-53	OLD BRIDGE TWP	402505	0742128	11.99		2.5	402505074212801			U	T	19750328		21.5	230920
230921	MIDDLESEX COUNTY UTILITIE	SR-54	OLD BRIDGE TWP	402502	0742134	4.27		2.5	402502074213401			U	T	19750328		22.	230921
230922	MIDDLESEX COUNTY UTILITIE	SR-56	OLD BRIDGE TWP	402459	0742139	1.4		2.5	402459074213901			U	T	19750402		33.	230922
230923	MIDDLESEX COUNTY UTILITIE	SR-57	OLD BRIDGE TWP	402457	0742142	4.25		2.5	402457074214201			U	T	19750328		21.5	230923
230924	MIDDLESEX COUNTY UTILITIE	SR-58	EAST BRUNSWICK TWP	402454	0742149	7.93		2.5	402454074214901			U	T	19750331		22.	230924
230925	MIDDLESEX COUNTY UTILITIE	SR-60	EAST BRUNSWICK TWP	402449	0742201	15.3		2.5	402449074220101			U	T	19750331		27.	230925
230926	MIDDLESEX COUNTY UTILITIE	SR-65	EAST BRUNSWICK TWP	402606	0742118	15.		2.5	402606074211801			U	T	19760318		27.	230926
230927	MIDDLESEX COUNTY UTILITIE	SR-66	EAST BRUNSWICK TWP	402605	0742122	8.48		2.5	402605074212201			U	T	19760318		22.	230927
230928	MIDDLESEX COUNTY UTILITIE	SR-67	EAST BRUNSWICK TWP	402605	0742125	9.98		2.5	402605074212501			U	T	19760319		22.	230928
230929	MIDDLESEX COUNTY UTILITIE	SR-68	EAST BRUNSWICK TWP	402603	0742128	3.96		2.5	402603074212801			U	T	19760319		22.	230929
230930	MIDDLESEX COUNTY UTILITIE	SR-71	EAST BRUNSWICK TWP	402601	0742133	0.1		2.5	402601074213301			U	T	19760323		27.	230930
230931	MIDDLESEX COUNTY UTILITIE	SR-72	EAST BRUNSWICK TWP	402602	0742135	15.73		2.5	402602074213501			U	T	19760322		30.	230931
230932	PRINCETON UNIVERSITY	CORE HOLE 1	PLAINSBORO TWP	402058	0743559	98.			402058074355801	231SCKN		U	Z			120	230932
230933	ELIZABETHTOWN WATER COMPA	EIGHTH STREET	SOUTH PLAINFIELD BORO	403549	0742608	70	350	12	403549074260801	231BRCK	81 350	P	W	19650305	25-12632	350	230933
230934	AMERICAN METAL MOULDING C	FOUR	EDISON TWP	403208	0742418	120	500	15	403208074241801	231BRCK	50 500	N	W	19821000	25-23302	500	230934
230934		FOUR	EDISON TWP	403208	0742418	120	500	10	403208074241801	231BRCK		N	W			500	230934
230936	COLUMBIAN CHEMICALS	ELEVEN	SOUTH BRUNSWICK TWP	402258	0743345	80	305	12	402258074334001	231LCKG	26.5 305	N	W	19510321	28-00247	305	230936
230936		ELEVEN	SOUTH BRUNSWICK TWP	402258	0743340	80	305	8	402258074334001	231LCKG		N	W			305	230936
230937	MIDDLESEX COUNTY UTILITIE	L-3	SAYREVILLE BORO	402815	0742203	8.0		2.5	402815074220301			U	T	19750331		40.	230937
230938	MIDDLESEX COUNTY UTILITIE	L-4	SAYREVILLE BORO	402815	0742204	-0.4		2.5	402815074220401			U	T	19750326		55.5	230938
230939	MIDDLESEX COUNTY UTILITIE	L-5	SAYREVILLE BORO	402815	0742205	-0.1		2.5	402815074220501			U	T	19750328		56.7	230939
230940	MIDDLESEX COUNTY UTILITIE	L-6	SAYREVILLE BORO	402816	0742206	8.82		2.5	402816074220601			U	T	19750318		40.	230940
230941	MIDDLESEX COUNTY UTILITIE	L-7	SAYREVILLE BORO	402819	0742213	4.2		2.5	402819074221301			U	T	19750325		40.	230941
230942	MIDDLESEX COUNTY UTILITIE	L-8	SAYREVILLE BORO	402820	0742214	3.9		2.5	402820074221401			U	T	19750331		42.	230942
230943	MIDDLESEX COUNTY UTILITIE	L-9	SAYREVILLE BORO	402821	0742218	5.		2.5	402821074221801			U	T	19750401		42.	230943

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
230944	MIDDLESEX COUNTY UTILITIE	L-10	SAYREVILLE BORO	402825	0742226	4.4		2.5	402825074222601				U	T	19750402		42.	230944
230945	MIDDLESEX COUNTY UTILITIE	L-11	SAYREVILLE BORO	402828	0742232	10.8		2.5	402828074223201				U	T	19750409		42.	230945
230946	MIDDLESEX COUNTY UTILITIE	L-12	SAYREVILLE BORO	402828	0742233	.07		2.5	402828074223301				U	T	19750410		46.	230946
230947	MIDDLESEX COUNTY UTILITIE	L-13	SOUTH RIVER BORO	402827	0742234	.7			402827074223401				U	T	19750410		42.	230947
230948	MIDDLESEX COUNTY UTILITIE	L-13A	SOUTH RIVER BORO	402830	0742236	5.0		2.5	402830074223601				U	T	19750509		42.	230948
230949	MIDDLESEX COUNTY UTILITIE	L-14	SOUTH RIVER BORO	402830	0742237	3.9			402830074223701				U	T	19750402		37.	230949
230950	MIDDLESEX COUNTY UTILITIE	L-15	SOUTH RIVER BORO	402831	0742240	3.6		2.5	402831074224001				U	T	19750401		36.	230950
230951	MIDDLESEX COUNTY UTILITIE	L-16	SOUTH RIVER BORO	402833	0742242	3.96		2.5	402833074224201				U	T	19750331		37.	230951
230952	MIDDLESEX COUNTY UTILITIE	L-17	SOUTH RIVER BORO	402836	0742249	3.66		2.5	402836074224901				U	T	19750328		33.	230952
230953	MIDDLESEX COUNTY UTILITIE	L-18	SOUTH RIVER BORO	402838	0742253	5.06		2.5	402838074225301				U	T	19750327		36.	230953
230954	MIDDLESEX COUNTY UTILITIE	L-19	SOUTH RIVER BORO	402840	0742259	4.26		2.5	402840074225901				U	T	19750326		31.	230954
230955	MIDDLESEX COUNTY UTILITIE	L-20	SOUTH RIVER BORO	402841	0742301	3.1		2.5	402841074230101				U	T	19750325		25.	230955
230956	MIDDLESEX COUNTY UTILITIE	L-21	SOUTH RIVER BORO	402844	0742306	4.9		2.5	402844074230601				U	T	19750403		34.	230956
230957	MIDDLESEX COUNTY UTILITIE	L-22	SOUTH RIVER BORO	402846	0742309	7.21		2.5	402846074230901				U	T	19750404		35.3	230957
230958	MIDDLESEX COUNTY UTILITIE	L-23	SOUTH RIVER BORO	402849	0742311	7.6		2.5	402849074231101				U	T	19750403		40.	230958
230959	MIDDLESEX COUNTY UTILITIE	L-24	SOUTH RIVER BORO	402851	0742313	11.16		2.5	402851074231301				U	T	19750327		21.	230959
230960	MIDDLESEX COUNTY UTILITIE	L-25	SOUTH RIVER BORO	402853	0742316	11.34		2.5	402853074231601				U	T	19750326		23.	230960
230961	MIDDLESEX COUNTY UTILITIE	L-26	SOUTH RIVER BORO	402854	0742318	10.2		2.5	402854074231801				U	T	19750324		39.	230961
230962	MIDDLESEX COUNTY UTILITIE	L-27	SOUTH RIVER BORO	402855	0742320	10.0		2.5	402855074232001				U	T	19750324		18.	230962
230963	MIDDLESEX COUNTY UTILITIE	L-28	SOUTH RIVER BORO	402856	0742326	7.4		2.5	402856074232601				U	T	19750324		30.	230963
230964	MIDDLESEX COUNTY UTILITIE	L-29	SOUTH RIVER BORO	402855	0742329	7.7		2.5	402855074232901				U	T	19750324		36.	230964
230965	MIDDLESEX COUNTY UTILITIE	L-30	SOUTH RIVER BORO	402854	0742333	20.9		2.5	402854074233301				U	T	19750321		50.	230965
230966	MIDDLESEX COUNTY UTILITIE	L-32	SOUTH RIVER BORO	402854	0742336	17.		2.5	402854074233601				U	T	19750320		52.	230966
230967	MIDDLESEX COUNTY UTILITIE	L-33	SOUTH RIVER BORO	402853	0742341	0.0		2.5	402853074234101				U	T	19750409		15.	230967
230968	MIDDLESEX COUNTY UTILITIE	L-34	SOUTH RIVER BORO	402854	0742342	9.6		2.5	402854074234201				U	T	19750328		41.	230968
230969	MIDDLESEX COUNTY UTILITIE	L-36	SOUTH RIVER BORO	402855	0742343	9.9		2.5	402855074234301				U	T	19750327		33.	230969
230970	MIDDLESEX COUNTY UTILITIE	L-38	SOUTH RIVER BORO	402857	0742346	1.3		2.5	402857074234601				U	T	19750411		19.8	230970
230971	MIDDLESEX COUNTY UTILITIE	L-39	NEW BRUNSWICK CITY	402903	0742347	6.3		2.5	402903074234701				U	T	19750519		28.	230971
230972	MIDDLESEX COUNTY UTILITIE	L-40	NEW BRUNSWICK CITY	402906	0742346	6.5		2.5	402906074234601				U	T	19750516		27.	230972
230973	NEW JERSEY HIGHWAY DEPART	NJ-01	SAYREVILLE BORO	403023	0741804	2.6			403023074180401				U	T	19380107		68.5	230973
230974	NEW JERSEY HIGHWAY DEPART	NJ-02	SAYREVILLE BORO	403023	0741803	2.6			403023074180301				U	T	19380108		62.	230974
230975	NEW JERSEY HIGHWAY DEPART	NJ-03	SAYREVILLE BORO	403026	0741804	2.6			403026074180401				U	T	19380111		78.5	230975
230976	NEW JERSEY HIGHWAY DEPART	NJ-04	SAYREVILLE BORO	403025	0741802	2.6			403025074180201				U	T	19380112		66.	230976
230977	NEW JERSEY HIGHWAY DEPART	NJ-05	SAYREVILLE BORO	403027	0741804	2.6			403027074180401				U	T	19380117		73.	230977
230978	NEW JERSEY HIGHWAY DEPART	NJ-06	SAYREVILLE BORO	403027	0741803	2.6			403027074180301				U	T	19380115		93.	230978
230979	NEW JERSEY HIGHWAY DEPART	NJ-07	SAYREVILLE BORO	403030	0741804	2.6			403030074180401				U	T	19380119		92.	230979
230980	NEW JERSEY HIGHWAY DEPART	NJ-08	SAYREVILLE BORO	403031	0741802	2.6			403031074180201				U	T	19380118		81.	230980
230981	NEW JERSEY HIGHWAY DEPART	NJ-09	SAYREVILLE BORO	403033	0741803	2.6			403033074180301				U	T	19380113		68.	230981
230982	NEW JERSEY HIGHWAY DEPART	NJ-10	SAYREVILLE BORO	403033	0741802	2.6			403033074180201				U	T	19380114		67.	230982
230983	NEW JERSEY HIGHWAY DEPART	NJ-11	WOODBRIDGE TWP	403035	0741803	2.6			403035074180301				U	T	19380111		74.5	230983
230984	NEW JERSEY HIGHWAY DEPART	NJ-12	WOODBRIDGE TWP	403034	0741802	2.6			403034074180201				U	T	19380110		75.	230984
230985	NEW JERSEY HIGHWAY DEPART	NJ-13	WOODBRIDGE TWP	403037	0741803	2.6			403037074180301				U	T	19380108		71.	230985
230986	NEW JERSEY HIGHWAY DEPART	NJ-14	WOODBRIDGE TWP	403037	0741802	2.6			403037074180201				U	T	19380107		74.2	230986
230987	NEW JERSEY HIGHWAY DEPART	NJ-15	WOODBRIDGE TWP	403039	0741803	2.6			403039074180301				U	T	19380114		74.6	230987
230988	NEW JERSEY HIGHWAY DEPART	NJ-16	WOODBRIDGE TWP	403039	0741802	2.6			403039074180201				U	T	19380113		73.	230988
230989	NEW JERSEY HIGHWAY DEPART	NJ-17	WOODBRIDGE TWP	403040	0741803	2.6			403040074180301				U	T	19380112		77.	230989
230990	NEW JERSEY HIGHWAY DEPART	NJ-18	WOODBRIDGE TWP	403041	0741802	2.6			403041074180201				U	T	19380111		77.	230990
230991	NEW JERSEY HIGHWAY DEPART	NJ-19	WOODBRIDGE TWP	403042	0741803	2.6			403042074180301				U	T	19380108		79.	230991
230992	NEW JERSEY HIGHWAY DEPART	NJ-20	WOODBRIDGE TWP	403042	0741802	2.6			403042074180201				U	T	19380104		75.	230992
230993	NEW JERSEY HIGHWAY DEPART	NJ-21A	SAYREVILLE BORO	403025	0741804	2.6			403025074180401				U	T	19380215		64.	230993
230994	NEW JERSEY HIGHWAY DEPART	NJ-22	SAYREVILLE BORO	403025	0741803	2.6			403025074180301				U	T	19380221		62.3	230994
230995	NEW JERSEY HIGHWAY DEPART	NJ-23	SAYREVILLE BORO	403028	0741804	2.6			403028074180401				U	T	19380221		80.	230995
230996	NEW JERSEY HIGHWAY DEPART	NJ-24	SAYREVILLE BORO	403027	0741802	2.6			403027074180201				U	T	19380221		94.5	230996
230997	NEW JERSEY HIGHWAY DEPART	NJ-25	SAYREVILLE BORO	403030	0741804	2.6			403030074180402				U	T	19380223		97.	230997
230998	NEW JERSEY HIGHWAY DEPART	NJ-26	SAYREVILLE BORO	403030	0741803	2.6			403030074180301				U	T	19380221		81.	230998
230999	NEW JERSEY HIGHWAY DEPART	NJ-27	SAYREVILLE BORO	403025	0741804	2.6			403025074180402				U	T	19380226		80.	230999
231000	US ARMY CORPS OF ENGINEER	DH-1	SAYREVILLE BORO	402845	0741529	0.0			402845074152901				U	T	19630600		41.7	231000
231001	US ARMY CORPS OF ENGINEER	DH-2	SAYREVILLE BORO	402813	0741512	0.0			402813074151201				U	T	19630600		22.	231001
231002	US ARMY CORPS OF ENGINEER	DH-3	OLD BRIDGE TWP	402823	0741436	0.0			402823074143601				U	T	19630600		40.1	231002
231003	US ARMY CORPS OF ENGINEER	DH-4	OLD BRIDGE TWP	402751	0741413	0.0			402751074141301				U	T	19630600		27.	231003
231004	US ARMY CORPS OF ENGINEER	DH-27A	SAYREVILLE BORO	402813	0741530	0.0			402813074153001				U	T	19630600		35.	231004
231005	US ARMY CORPS OF ENGINEER	DH-28	OLD BRIDGE TWP	402755	0741458	0.0			402755074145801				U	T	19630600		31.5	231005
231007	US ARMY CORPS OF ENGINEER	DH-30	OLD BRIDGE TWP	402731	0741348	0.0			402731074134801				U	T	19630600		40.	231007
231008	CLARK, ROMAN	DOMESTIC	EAST BRUNSWICK TWP	402414	0742625	120	66		402414074262501	211ODBG	58	66	H	W	19830222	28-13318	78	231008
231009	YAROS, JOHN	DOMESTIC	SOUTH BRUNSWICK TWP	402157	0743525	110	51		402127074351901	211MRPA			H	W	19620816	28-04465	51	231009
231010	ZINSMEISTER, JACK	DOMESTIC	PLAINSBORO TWP	401844	0743448	60	79		401844074344801	211FRNG	76	79	H	W	19670901	28-06237	81	231010
231011	MAN. & ENG. CORP.	M&E2	SAYREVILLE BORO	402833	0742041	6.		6.	402833074204101				U	U	19290000		63.	231011
231012	MAN. & ENG. CORP.	M&E2A	SAYREVILLE BORO	402819	0742046	22.		6.	402819074204601				U	U	19290000		73.6	231012
231013	MAN. & ENG. CORP.	M&E2B	SAYREVILLE BORO	402806	0742044	35.		8.	402806074204401				U	U	19290000		163.	231013
231013		M&E2B	SAYREVILLE BORO	402806	0742044	35.		6	402806074204401				U	U			163.	231013
231014	MAN. & ENG. CORP.	M&E3	SAYREVILLE BORO	402739	0742027	100.		6.	402739074202701				U	U	19290000		311.	231014
231015	HERCULES POWDER CO	TEST WELL 5	SAYREVILLE BORO	402819	0742107	28.	128.	6.	402819074210701	211FRNG	120.9	128.	U	W	19380113		129.	231015
231016	E.I. DUPONT	LAYNE #4	SAYREVILLE BORO	402722	0741942	88.	277.5	18.	402722074194201	211FRNG	221.58	257.	U	W	19270807		292.	231016
231016		LAYNE #4	SAYREVILLE BORO	402722	0741942	88.	277.5	12.	402722074194201	211FRNG	267.17	277.5	U	W			292.	231016
231017	SAYRE & FISHER	29A	SAYREVILLE BORO	402818	0742127	16.			402818074212701				U	U			975.	231017
231018	E.I. DUPONT	1-A	SAYREVILLE BORO	402841	0742037	5.0		5.	402841074203701				U	Z	19410218		80.5	231018
231019	E.I. DUPONT	2-B	SAYREVILLE BORO	402840	0742029	15.		5.	402840074202901				U	Z	19410220		106.42	231019
231020	E.I. DUPONT	3-C	SAYREVILLE BORO	402838	0742022	10.		5.	402838074202201				U	Z	19410222		83.25	231020
231021	E.I. DUPONT	4-D	SAYREVILLE BORO	402836	0742014	15.		5.	402836074201401				U	Z	19410225		91.67	231021
231022	E.I. DUPONT	5-E	SAYREVILLE BORO	402835	0742007	15.		5.	402835074200701				U	Z	19410227		98.25	231022
231023	E.I. DUPONT	7-G	SAYREVILLE BORO	402833	0741950	25.		5.	402833074195001				U	Z	19410304		129.75	231023
231024	E.I. DUPONT	8-H	SAYREVILLE BORO	402833	0741942	25.		5.	402833074194201				U	Z	19410306		122.25	231024
231025	E.I. DUPONT	10-J	SAYREVILLE BORO	402834	0741926	10.		5.	402834074192601				U	Z	19410318		125.75	231025
231026	E.I. DUPONT	11-K	SAYREVILLE BORO	402845	0741924	14.		5.	402845074192401				U	Z	19410320		119.	231026
231027	E.I. DUPONT	13-M	SAYREVILLE BORO	402905	0741917	8.		5.	402905074191701				U	Z	19410315		99.17	231027
231028	E.I. DUPONT	14-N	SAYREVILLE BORO	402910	0741912	10.		5.	402910074191201				U	Z	19410313		98.67	231028
231029	NATIONAL LEAD	15-O	SAYREVILLE BORO	402916	0741908	18.		5.	402916074190801				U	Z	19410000		109.5	231029
231030	NATIONAL LEAD	16-P	SAYREVILLE BORO	402922	0741905	18.		5.	402922074190501				U	Z	19410212		108.75	231030
231031	NATIONAL LEAD	17-Q	SAYREVILLE BORO	402926	0741859	18.		5.	402926074185901				U	Z	19410210		120.67	231031
231032	NATIONAL LEAD	18-R	SAYREVILLE BORO	402929	0741853	18.		5.	402929074185301				U	Z	19410207		117.83	231032

GWSI

UNIQUE ID	SITE OWNER	LOCAL ID	MUNICIPALITY	LAT	LON	ALTITUDE	DEPTH	DIAMETER	STATION ID	AQUIFER	SCREENED INTERVAL		W	S	DATE	PERMIT	DEPTH DRILLED	UNIQUE ID
231033	NATIONAL LEAD	19-S	SAYREVILLE BORO	402933	0741846	18.		5.	402933074184601				U	Z	19410205		111.5	231033
231034	NATIONAL LEAD	20-T	SAYREVILLE BORO	402937	0741840	18.		5.	402937074184001				U	Z	19410203		113.67	231034
231035	CALIFORNIA REFINING	TEST WELL #4	PERTH AMBOY CITY	403210	0741621	25.		6.	403210074162101				U	T	19510905	26-00111	110.	231035
231036	CALIFORNIA REFINING	TEST WELL #6	PERTH AMBOY CITY	403200	0741605	37.		6.	403200074160501				U	T	19510905	26-00122	106.	231036
231037	CALIFORNIA REFINING	TEST WELL #7	PERTH AMBOY CITY	403156	0741626	54.		6.	403156074162601				U	T	19510905	26-00125	136.	231037
231038	CALIFORNIA REFINING	TEST WELL #8	PERTH AMBOY CITY	403214	0741714	66.		6.	403214074171401				U	T	19510905	26-00126	113.	231038
231039	CALIFORNIA REFINING	TEST WELL #9	PERTH AMBOY CITY	403158	0741608	53.		6.	403158074160801				U	T	19510905	26-00123	116.	231039
231040	CALIFORNIA REFINING	TEST WELL #15	PERTH AMBOY CITY	403156	0741622	56.		6.	403156074162201				U	T	19510905	26-00257	139.5	231040
231041	MIDDLESEX COUNTY UTILITIE	MONITORING #1	SAYREVILLE BORO	402807	0742204	5.	58.	4.	402807074220401	211FRNG	48.	58.	U	O	19780200	28-10143	76.	231041
231042	MIDDLESEX COUNTY UTILITIE	MONITORING #2	SAYREVILLE BORO	402757	0742214	5.	57.	4.	402757074221401	211FRNG	47.	57.	U	O	19780200	28-10142	66.	231042
231043	DOW JONES CO	BACKUP-2	SOUTH BRUNSWICK TWP	402207	0743510	120	150	6	402207074351001	231LCKG	73	150	U	W	19790700	28-11137	150	231043
231044	MAGYAR SAVINGS & LOAN ASS	MAGYAR 1	SOUTH BRUNSWICK TWP	402630	0743206	130	185	10	402630074320601	231BRCK	50	185	C	W	19691104	28-06766	185	231044
231044		MAGYAR 1	SOUTH BRUNSWICK TWP	402630	0743206	130	185	6	402630074320601	231BRCK			C	W			185	231044
231045	NJ DEPT OF TRANSPORTATION	SAND HILLS 1	SOUTH BRUNSWICK TWP	402434	0743238	240	245	8	402434074323801	231LCKG	71.83	245	H	W	19590629	28-03473	245	231045
231046	CITIES SERVICE CO	15-1970	SOUTH BRUNSWICK TWP	402301	0743320	75	342	8	402301074332001	231LCKG	67	342	N	W	19700831	28-06846	342	231046
231046	COLUMBIAN CHEMICALS	15-1970	SOUTH BRUNSWICK TWP	402301	0743320	75	342		402301074332001	231LCKG			N	W			342	231046
231047	OTHEN, JR. ED	OTHEN 1	NORTH BRUNSWICK TWP	402602	0742910	110	85	10	402602074291001	231BRCK	50	85	I	W	19810717	28-12317	85	231047
231047		OTHEN 1	NORTH BRUNSWICK TWP	402602	0742910	110	85	6	402602074291001	231BRCK			I	W			85	231047
231048	CARDONE, ANGELO C	CARDONE	NORTH BRUNSWICK TWP	402703	0742928	120	74	6	402703074292801	231BRCK	25	74	H	W	19640826	28-05084	74	231048
231049	PASTORE, JOSEPH	PASTORE 1	NORTH BRUNSWICK TWP	402824	0742751	110	175	6	402824074275101	231BRCK	50	175	I	W	19800921	28-11860	175	231049
231050	REVEY, EMERY J	SOD FARM WELL	NORTH BRUNSWICK TWP	402721	0743031	100	234	6	402721074303101	231BRCK	26	234	I	W	19630926	28-04791	234	231050
231051	RUTGERS UNIVERSITY	COOK FARM HOUSE	NORTH BRUNSWICK TWP	402804	0742539	50	160	10	402804074253901	231BRCK	53	160	H	W	19740227	25-17373	160	231051
231051		COOK FARM HOUSE	NORTH BRUNSWICK TWP	402804	0742539	50	160	6	402804074253901	231BRCK			H	W			160	231051
231052	GARY MANUFACTURING	INDUSTRIAL-1977	NEW BRUNSWICK CITY	402806	0742839	90	125	10	402806074283901	231BRCK	54	125	N	W	19771000	25-19597	125	231052
231052		INDUSTRIAL-1977	NEW BRUNSWICK CITY	402806	0742839	90	125	6	402806074283901	231BRCK			N	W			125	231052
231053	RUTGERS UNIVERSITY	RUTGERS GOLF COU	PISCATAWAY TWP	403110	0742812	60	300	12	403110074281201	231BRCK	55	300	I	W	19800630	25-21440	300	231053
231053		RUTGERS GOLF COU	PISCATAWAY TWP	403110	0742812	60	300	8	403110074281201	231BRCK			I	W			300	231053
231054	RISS INTERNATIONAL	ONE	WOODBRIDGE TWP	403503	0741542	15	300	10	403503074154201	231BRCK	50	300	C	W	19800124	26-04831	300	231054
231054	USA EASTERN	ONE	WOODBRIDGE TWP	403503	0741542	15	300	6	403503074154201	231BRCK			C	W			300	231054
231055	MIDDLESEX WATER COMPANY	TINGLEY LANE 5	EDISON TWP	403527	0742223	75	532	12	403527074222301	231BRCK	40.18	532	P	W	19550705	25-04516	532	231055
231056	MIDDLESEX COUNTY UTILITIE	MONITORING #3	SAYREVILLE BORO	402743	0742216	5.	53.	4.	402743074221601	211FRNG	43.	53.	U	O	19780200	28-10141	77.	231056
231057	US ARMY CORPS OF ENGINEER	DH-26A		402887	0741586	0.			402887074158601				U	T	19630600		35.5	231057
231058	US GEOLOGICAL SURVEY	HESS BROS #1		402704	0742139	25.	122.	8.75	402704074213901	211FRNG	112.	122.	U	O	19861029	28-17742-5	173.	231058
231059	US GEOLOGICAL SURVEY	HESS BROS #2		402704	0742139	25.	148.	8.75	402704074213902	211FRNG	138.	148.	U	O	19861120	28-17743-6	167.	231059
231059		HESS BROS #2		402704	0742139	25.	148.	4.	402704074213902	211FRNG			U	O			167.	231059
231060	US GEOLOGICAL SURVEY	MARSH AVE #1		402802	0742022	40.	148.	8.75	402802074202201	211FRNG	138.	148.	U	O	19861207	25-28904-7	251.	231060
231061	ELIZABETHTOWN WC	SEBRINGS MILL 8	MIDDLESEX BORO	403504	0743026	35	430	16	403504074302601	231BRCK	51	430	P	W	19651119	25-13397	430	231061
231061		SEBRINGS MILL 8	MIDDLESEX BORO	403504	0743026	35	430	12	403504074302601	231BRCK			P	W			430	231061
231062	ST AUGUSTINE CHURCH	SCHOOL 1	SOUTH BRUNSWICK TWP	402557	0743221	145	300	12	402559074322101	231BRCK	42.17	300	U	W	19620727	28-04424	300	231062
231062		SCHOOL 1	SOUTH BRUNSWICK TWP	402559	0743221	145	300	8	402559074322101	231BRCK			U	W			300	231062
231063	FMC RESEARCH LAB	1-WELLNITZ FARM	PLAINSBORO TWP	402026	0743730	95.75	443	13.33	402026074373001	231SCKN	422	443	N	W	19560700	28-01854	443	231063
231065	PRINCETON FOLDING BOX CO	SARSTEDT 1	SOUTH BRUNSWICK TWP	402150	0743601	100	325	6	402150074360101	231LCKG	72	325	C	W	19610515	28-04388	326	231065
231065	SARSTEDT INC	SARSTEDT 1	SOUTH BRUNSWICK TWP	402150	0743601	100	325		402150074360101	231LCKG			C	W			326	231065
231066	WHITE, STANLEY	DOMESTIC-1985	CRANBURY TWP	401819	0743402	90	90		401819074340201	211FRNG	80	90	H	W	19850125	28-14823	95	231066
231067	PROTINICK, MICHAEL	DOMESTIC 2-1966	CRANBURY TWP	402008	0743251	100	70		402008074325101	211FRNG	64	70	H	W	19660916	28-06022	70	231067
231068	PROTINICK, JOHN	DOMESTIC 1-1972	CRANBURY TWP	401943	0742925	110	128		401943074292501	211ODBG	125	128	H	W	19720700	28-07578	129	231068
231069	BARCLAY FARMS	BARKLEY FARMS DO	CRANBURY TWP	401901	0743134	105	64		401901074313401	211ODBG	61	64	H	W	19650800	28-05555	66	231069
231070		APPLEGATE #6		401948	0742745	125.	285.		401948074274501	211FRNG	245.	285.	U	Z				231070
231071	MIDDLESEX WATER COMPANY	PARK 25	SOUTH PLAINFIELD BORO	403545	0742433	70	448	12	403545074243301	231BRCK	94	448	P	W	19650000	25-11815	448	231071
231072	MIDDLESEX WATER COMPANY	TINGLEY 2	EDISON TWP	403536	0742228	80	560	12	403536074222801	231BRCK	74	454	P	W	19500000	25-03970	560	231072
231072		TINGLEY 2	EDISON TWP	403536	0742228	80	560	12	403536074222801	231BRCK			P	W	19541122		560	231072
231073	KENDALL CONTINENTAL	KENDALL PARK 3	SOUTH BRUNSWICK TWP	402525	0743351	160	412	14	402525074335101	231BRCK	35	412	Z	Z	19560428		412	231073
231073	SOUTH BRUNSWICK TWP	KENDALL PARK 3	SOUTH BRUNSWICK TWP	402525	0743351	160	412	10	402525074335101	231BRCK			Z	Z			412	231073
231074	ST AUGUSTINE CHURCH	CHURCH 1	SOUTH BRUNSWICK TWP	402557	0743214	145	125.5	6	402557074321401	231BRCK	43.42	125.5	U	W	19530106	28-00757	125.5	231074
231075	ASHWILL CORPORATION	INDUSTRIAL 1	NORTH BRUNSWICK TWP	402543	0743107	110	251	14	402543074310701	231BRCK	31.17	251	U	W	19541209	28-01429	251	231075
231075	STEARNS & FOSTER CO	INDUSTRIAL 1	NORTH BRUNSWICK TWP	402543	0743107	110	251	10	402543074310701	231BRCK			U	W			251	231075
231076	US GEOLOGICAL SURVEY	CORE HOLE A	NORTH BRUNSWICK TWP	402630	0742959	110	68	6	402630074295902	231BRCK	12	68	U	Z	19860527	29-16276	68	231076
231076		CORE HOLE A	NORTH BRUNSWICK TWP	402630	0742959	110	68	3	402630074295902	231BRCK			U	Z			68	231076
231077	US GEOLOGICAL SURVEY	JCPSL-SAY		402831	0742120	7	56	6.25	402831074212001	211FRNG	46	56	U	O	19870227		73	231077
231078	US GEOLOGICAL SURVEY	SAYER ST		402721	0742210	12	78	6.25	402721074221001	211FRNG	68	78	U	O	19870205		84	231078
231079	CAPTIVE PLASTICS	BACKUP-1983	PISCATAWAY TWP	403330	0742843	60	230	8	403330074284301	231BRCK	50	230	N	W	19830526	25-23677	230	231079
		1977-MAIN	PISCATAWAY TWP	403330	0742842	60	200	10	403330074284201	231BRCK	50	200	J	W	19770000		200	231080
231080		[illegible]	PISCATAWAY TWP	403330	0742842	60	200	8	403330074284201	231BRCK			J	W			200	231080
231081	COLUMBIAN CHEMICALS	I-1948	SOUTH BRUNSWICK TWP	402300	[illegible]	70	221	6	402300074333001	231LCKG	25	221	N	W	19480000	48-00030	221	231081
231083	JOHNSON & JOHNSON CO	IRRIGATION-UNUSE	NORTH BRUNSWICK TWP	402630	0742959	110	407	6	[illegible]0074295901	231BRCK	20	409	U	W	19600000		409	231083
231084	PRINCETON UNIVERSITY	DOE WELL D1	PLAINSBORO TWP	402048	0743555	80.9	5.1	0.5	402048074355501		3.6	5.1	[illegible]	[illegible]	[illegible]	28-16086	5.1	231084
231085	PRINCETON UNIVERSITY	DOE WELL D2	PLAINSBORO TWP	402052	0743558	86.3	5.8		402052074355801	231SCKN	4.3	5.8	U	O	19850716	28-16087	[illegible]	
231086	PRINCETON UNIVERSITY	DOE WELL D3	PLAINSBORO TWP	402052	0743558	86.3	17.0		402052074355802	231SCKN	14.0	17.0	U	O	19861025	28-17693	17.0	231086
231087	PRINCETON UNIVERSITY	DOE WELL D4	PLAINSBORO TWP	402051	0743555	84.4	19.		402051074355501	231SCKN	16.	19.	U	O	19861030	28-17694	19.	231087
231088	PRINCETON UNIVERSITY	DOE WELL D5	PLAINSBORO TWP	402050	0743553	81.5	18.0		402050074355301	231SCKN	15.	18.	U	O	19861030	28-17695	18.0	231088
231089	PRINCETON UNIVERSITY	DOE WELL H1	PLAINSBORO TWP	402039	0743601	77.6	6.2		402039074360101		4.7	6.2	U	O	19850628	28-16082	6.2	231089
231090	PRINCETON UNIVERSITY	DOE WELL H1A	PLAINSBORO TWP	402039	0743601	77.4	18.0		402039074360102	231SCKN	15.0	18.	U	O	19861030	28-17690	18.0	231090
231091	PRINCETON UNIVERSITY	DOE WELL H2	PLAINSBORO TWP	402040	0743602	80.5	5.2		402040074360201		3.7	5.2	U	O	19850716	28-16083	5.2	231091
231092	PRINCETON UNIVERSITY	DOE WELL H3	PLAINSBORO TWP	402042	0743606	84.5	10.1		402042074360601		8.6	10.1	U	O	19850716	28-16084	10.1	231092
231093	PRINCETON UNIVERSITY	DOE WELL H3A	PLAINSBORO TWP	402042	0743606	84.4	19.5		402042074360602	231SCKN	16.5	19.5	U	O	19861030	28-17691	19.5	231093
231094	PRINCETON UNIVERSITY	DOE WELL H4	PLAINSBORO TWP	402047	0743609	88.1	9.7		402047074360901		8.2	9.7	U	O	19850716	28-16085	9.7	231094
231095	PRINCETON UNIVERSITY	DOE WELL H4A	PLAINSBORO TWP	402047	0743609	38.3	16.2		402047074360902	231SCKN	13.2	16.2	U	O	19861030	28-17692	16.2	231095
231096	PRINCETON UNIVERSITY	DOE WELL N1	PLAINSBORO TWP	402103	0743556	91.5	9.5		402103074355601		8.0	9.5	U	O	19850628	28-16090	9.5	231096
231097	PRINCETON UNIVERSITY	DOE WELL N2	PLAINSBORO TWP	402102	0743559	92.3	9.6		402102074355901		8.1	9.6	U	O	19850716	28-16091	9.6	231097
231098	PRINCETON UNIVERSITY	DOE WELL N3	PLAINSBORO TWP	402102	0743601	92.0	16.3		402102074360101	231SCKN	14.8	16.3	U	O	19850923	28-16092	16.3	231098
231099	PRINCETON UNIVERSITY	DOE WELL N4A	PLAINSBORO TWP	402103	0743606	75.9	11.0		402103074360601	231SCKN	8.	11.	U	O	19861030	28-17688	11.0	231099
231100	PRINCETON UNIVERSITY	DOE WELL N4B	PLAINSBORO TWP	402103	0743606	75.9	6.0		402103074360602		3.	6.	U	O	19861030	28-17689	12.0	231100
231101	PRINCETON UNIVERSITY	DOE WELL R2	PLAINSBORO TWP	402101	0743552	89.9	13.9		402101074355201		12.4	13.9	U	O	19850627	28-16088	13.9	231101
231102	PRINCETON UNIVERSITY	DOE WELL R3	PLAINSBORO TWP	402059	0743557	93.5	10.3		402059074355702		8.8	10.3	U	O	19850628	28-16089	10.3	231102
231103	PRINCETON UNIVERSITY	DOE WELL R4A	PLAINSBORO TWP	402100	0743554	93.5	18.0		402100074355401	231SCKN	15.0	18.0	U	O	19860303	28-16093	18.0	231103
231104	PRINCETON UNIVERSITY	DOE WELL R4B	PLAINSBORO TWP	402100	0743554	93.5	15.		402100074355402		12.	15.	U	O	19861030	28-17696	15.	231104
231105	PRINCETON UNIVERSITY	DOE WELL R5A	PLAINSBORO TWP	402100	0743553	92.7	30.0		402100074355301	231SCKN	27.0	30.0	U	O	19860300	28-16094	30.0	231105
231106	PRINCETON UNIVERSITY	DOE WELL R5B	PLAINSBORO TWP	402100	0743553	92.7	23.0		402100074355302		20.	23.0	U	O	19861030	28-17697	23.0	231106
231107	PRINCETON UNIVERSITY	DOE WELL R6	PLAINSBORO TWP	402100	0743552	91.3	27.0		402100074355201	231SCKN	24.0	27.0	U	O	19860300	28-16095	27.0	231107
231109	PRINCETON UNIVERSITY	DOE WELL R8A	PLAINSBORO TWP	402101	0743549	36.3	28.0		402101074354901	231SCKN	25.0	28.0	U	O	19860300	28-16096	28.0	231108

REFERENCE NO. 16

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth File (J030)
DATE: March 26, 1992
FROM: Claire Baruzzi
COPIES: —
SUBJECT: Potable water supply wells located within 4 miles of the EL Beth site.
REFERENCE: See below.

Summary: Potable water supply wells that are located within a 4-mile radius of the EL Beth site have been identified and the number of people served have been determined. Private wells and public wells (including emergency supply wells) have been addressed.

The Sayreville Water Dept. and South Amboy Water Dept. wells are located within 4 miles of the EL Beth site, across the Raritan River. The South Amboy wells currently are not in use; they are reserved for emergency use only. South Amboy obtains its water from the Perth Amboy system. No other public potable water supply wells are located within 4 miles of the site. Other municipalities in the area obtain their water from wells located outside of the site's 4-mile radius, or from surface water supplies, which are not located along the site's 15-mile surface water route. USGS data for wells with production rates greater than 75 gal/minute in Middlesex County include, within 4 miles of the EL Beth site, three domestic wells. Two of the wells are reported to be not in use; one is located 4 miles from the EL Beth site, and its current status has not been confirmed.

Wells and populations served are listed on the following page. A list of references is given, and references are attached.

(continued on reverse)

NUS 443A 58 1182

Potable Water Supply Wells Located Within 4 miles of the EL Beth Site.

Distance Category, miles	Potable Water Supply Well Identification	Population Served	Comments
0.0 to 0.25	(none)	0	—
>0.25 to 0.50	(none)	0	—
>0.50 to 1.0	(none)	0	—
>1.0 to 2.0	(none)	0	—
>2.0 to 3.0	South Amboy public wells	8,500	These wells currently are not in use; they are being maintained for emergency use only. South Amboy obtains its water from the Perth Amboy supply. These wells are located across the Raritan River from the EL Beth site
>3.0 to 4.0	Sayreville public wells	approximately 12,000	Five wells; 2 draw from the aquifer of concern (Farrington) and 3 draw from the more shallow, Old Bridge aquifer. The water from the deep and shallow wells at this location is mixed. Recharge water from the South River is also mixed with the well water.
	Private well approx. 4 miles from EL Beth site.	(Estimate 4 people)	Current status not confirmed

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth File

DATE: March 26, 1992

FROM: Claire Barufie

COPIES: -

SUBJECT: Potable water supply wells located within 4 miles of the EL Beth site.

REFERENCE: The following references document potable water supply wells within 4 miles of the EL Beth site, and those communities served by other sources:

1. Telecon Note: Conversation between Mr. Joe Rudy, Sayreville Water Dept., and Claire Barufie, HNUS, March 16, 1992.
2. Telecon Note: Conversation between Kathy, South Amboy Water Dept., and Claire Barufie, HNUS, March 13, 1992.
3. Telecon Note: Conversation between Mrs. Myers, Middlesex Water Company, ~~March 13, 1992~~ and Claire Barufie, HNUS, March 13, 1992.
4. Telecon Note: Conversation between Mr. Rich Sadowski, Elizabethtown Water Company, and Claire Barufie, HNUS, March 10, 1992.
5. Telecon Note: Conversation between Mr. William Lund, Edison Engineering Dept., and Claire Barufie, HNUS, March 13, 1992.
6. Telecon Note: Conversation between Mr. Turan Ramadan, Perth Amboy Water Dept., and Claire Barufie, HNUS, March 13, 1992.
7. Telecon Note, (#2); Conversation between Mr. Turan Ramadan, Perth Amboy Water Dept., and Claire Barufie, HNUS, March 13, 1992.
8. Telecon Note: Conversation between Mr. Joe Rudy, Sayreville Water Dept., and Diane Minsavage, HNUS, October 24, 1991.
9. Telecon Note: Conversation between Mr. Jerry Gainet, South Amboy Water Dept., and Diane Minsavage, October 22, 1991.
10. Telecon Note: Conversation between Mr. Richard Mechanic, South Amboy Water Dept., and Maria Caler, of ~~HNUS~~ NUS, Feb 21, 1990.
11. Telecon Note: Conversation between Mr. Joe Ritter, Middlesex Water Company, and Edmund Knyfd, Jr., NUS, September 25, 1990.

Continued

Potable Water Supply Wells Located Within 4 miles of the El Beth Site.

12. Telecon Note: Conversation between Mr. Frank Falco, Middlesex Water Company, and Sue Lenczyk, NUS, February 9, 1990.
13. Telecon Note: Conversation between Mr. Guy Leighton, Woodbridge Twp. Engineering Office, and Edmund Knyfd, Jr., NUS, Sept 25, 1990.
14. Telecon Note: Conversation between Mr. Jay Elliot, Dept. of Health and Human Resources, Edison, and Sue Lenczyk, NUS, March 15, 1990.
15. Telecon Note: Conversation between Mr. Jay Elliot, Edison Dept. of Health and Human Services, and Sue Lenczyk, NUS, March 19, 1990.

~~16. Telecon Note: Conversation between Mr. Jay Elliott, Edison Health Dept, and Sue Lenzyk, NUS, March 19, 1990.~~

16. Telecon Note: Conversation between City Engineer, Township of Edison, and D. Lamond, NUS, June 19, 1986.
17. Telecon Note: Conversation between Mr. Garnett, S. Amboy Water Dept., and Bob Cantagallo, NUS, August 30, 1990.
18. Telecon Note: Conversation between Mrs. Ciraky, well owner in Fords, N.J., and Bruce Sanders, NUS, July 11, 1990.

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 16, 1992	1040

DISTRIBUTION:

Page 1 of 2

EL Both file

BETWEEN:	OF:	PHONE:
Mr. Joe Rudy	Sayreville Water Dept.	(908) 390-7067

AND:

Claire Baruzzis (NUS)

DISCUSSION:

Mr. Rudy said that the Sayreville Water Dept. has 2 plants, in town. One is located at Bordentown Avenue + Jerneymill Road; the wellfield is located right behind the plant; it occupies a radius of about 4 acres and consists of 11 wells.

The other plant is located in the Morgan section of Sayreville Township, at Route 35 South - it's about 1/2 mile north of the border with Old Bridge, by Gordon Ave, about 1 block from Route 35. There are 5 wells at this plant; 3 are shallow and 2 are deep. The shallow wells draw from the Old Bridge aquifer, and are 125 to 130 feet deep, and screened at about 80 feet deep; 'R' well at about 90 feet and 'T' well at about 83 feet. The deep wells draw from the Farrington aquifer; their depth is about 280 feet; The water level, well 'S' is about 250 feet deep and screen is about 34 feet long.

Regarding the Old Bridge (shallow) wells, he said they are not to pump below depth of 100 feet.

ACTION ITEMS: cont

He said the supply is a loop system; the 2 water plants serve 2 sections, and also, the Dept. purchases 2 million gallons per day from Middlesex Water Co. He said that very seldom does Morgan well water go to the Bordentown section, because water pressure from the Middlesex Water Co. supply prevents this. He said that a total population of 38,000 is served. He estimates that the plant in the Morgan section

5

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 16, 1992	1040

DISTRIBUTION:

EL Beth file

BETWEEN:	OF:	PHONE:
Mr. Joe Rudy	Sayreville Water Dept.	(908) 390-7067

AND: Claire Baruzzo (NUS)

DISCUSSION:

serves approximately one-third of this population, or 12,000 people. He said that in the summer (peak) season, The Morgan system supplies 3.2 MGD (million gallons per day), the Bordentown system supplies about 4 MGD and Middlesex Water Co. supplies 2 MGD. He said the relative amount supplied by Middlesex Water Co., a surface water supply, is higher in winter.

He said that Sayreville Water Dept. also uses about 1 MGD of surface water from recharge lagoons - pumped from the South River to lagoons - the lagoon water is mixed with well water.

ACTION ITEMS:

Note: the water supply located in the Morgan section is located between 3 and 4 miles from the EL Beth site.

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 13, 1992	1425

DISTRIBUTION:

E L Beth file

BETWEEN:	OF:	PHONE:
Kathy	South Amboy Water Dept.	(908) 721-1211

AND: Claire Barnes (NUS)

DISCUSSION:

Kathy said that currently, South Amboy is still buying its water from Perth Amboy. South Amboy is not using any of its own wells. The South Amboy water treatment plant would open for emergency use only.

She said that Mr. Garnet will return in about 20 minutes, and agreed that if he has further information, such as when the South Amboy Water Dept wells may be used again, he will return my call.

ACTION ITEMS:

7

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 13, 1992	1618

DISTRIBUTION:

El Beth file

BETWEEN:	OF:	PHONE:
Mrs. Myers	Middlesex Water Company	(908) 634-1500

AND: Claire Barujis (NUS)

DISCUSSION:

Mrs. Myers said that Middlesex Water Co. has no emergency supply wells in Edison or Woodbridge.

She said that this water company's wells are located in South Plainfield and at North Tingley and South Tingley Lanes in Edison.

ACTION ITEMS:

Note that Middlesex Water Co. wells are not located within 4 miles of the El Beth site.

(8)

NUS CORPORATION AND SUBSIDIARIES | **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 10, 1992	1510

DISTRIBUTION:

E.L. Beth file

BETWEEN:	OF:	PHONE:
Mr. Rich Sadowski	Elizabethtown Water Company	(908) 654-1234

AND:

Claire Bawufie (NUS)

DISCUSSION:

Mr. Sadowski said that Elizabethtown Water Company does not have any wells in the following towns: Edison, Woodbridge (or Port Reading, Sewaren, Hopelawn, Fords, Keasby), Sayreville and South Amboy.

ACTION ITEMS:

(9)

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 13, 1992	1553

DISTRIBUTION:

EC Beth file

BETWEEN:	OF:	PHONE:
William Lund	Edison Engineering Dept. (Director)	(908) 287-0900

AND: Claire Barufo (NUS)

DISCUSSION:

Mr. Lund said that it has been many years since emergency supply wells in Edison were used.

ACTION ITEMS:

10

NUS CORPORATION AND SUBSIDIARIES | **TELECON NOTE**

CONTROL NO.: JO30

DATE: March 13, 1992

TIME: 1450

DISTRIBUTION:

EL Beth file

BETWEEN: Turan Ramadan

OF: Perth Amboy Water Dept. (Superintendent)

PHONE: (908) 442-2397

AND: Claire Barnes (NUS)

DISCUSSION:

I phoned to confirm the locations of Perth Amboy water supply wells (public potable water supply):

He said that the City of Perth Amboy has wells near Tennent Pond in Old Bridge, which pump from the Old Bridge Sand; Well Nos. 5, 6 and 7 are at the north side of the pond, and Well No. 8 is southeast of the pond. Also, Perth Amboy has what are called collector wells (also called 'Ranney' well), near Deep Run in Old Bridge, about 4000 feet south of Tennent Pond - this also draws from the Old Bridge Sand. He said that the City of Perth Amboy has no emergency wells in Woodbridge. The Perth Amboy water system serves the City of Perth Amboy, and is shared with South Amboy.

Mr. Ramadan noted that there is a reservoir at Florida Grove Road. He asked that I phone back at about 4:00, as he must now go to a meeting; we can complete the discussion when I call back.

ACTION ITEMS:

(11)

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.: J030	DATE: March 13, 1992	TIME: 1605

DISTRIBUTION:

EL Beth File

BETWEEN: Mr. Turan Ramadan	OF: Perth Amboy Water Dept. (Superintendent)	PHONE: (908) 442-2397

AND: Claire Barufis (NUS)

DISCUSSION:

(Continuation of telecon at 1450 hrs on March 13, 1992)

Mr. Ramadan said that the City of Perth Amboy has a finished water reservoir located in Perth Amboy, at Florida Grove Road. (Mr. Ramadan said that it is 5 acres in size, and is the largest reservoir in the U.S.A.). The reservoir serves only Perth Amboy ~~and South Amboy~~. Water from the Perth Amboy public supply wells is treated, and, the reservoir water is from this system.

Also, there is a groundwater recharge reservoir at the Ranney well; he said that when the Ranney well is done it will be very large (88 acres) and it will be supplied by this reservoir.

ACTION ITEMS:

Note that the City of Perth Amboy public water supply wells are located more than 4 miles from the EL Beth site (the wells are near, and south of, Tennent Pond in Old Bridge).

(12)

J008-$I

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.: J008	DATE: October 24, 1991	TIME: 1426

DISTRIBUTION:

South Amboy Gas Works

BETWEEN: Joe Rudy	OF: Sayreville Water Department	PHONE: (908) 390-7067

AND: Diane Minsavage (NUS)

DISCUSSION:

I called Mr. Rudy to determine what municipal wells are in service and the population served by Sayreville Water Department. I told Mr. Rudy that I had plotted wells listed on a 1989 DEP printout, and had come up with two well-fields in use within 4 miles of the site. Mr. Rudy said that the Bordentown Water Plant, uses wells A through L (M is not in use), all of which are in service (E and G are having problems and will be redrilled shortly), the total volume from this well field is approximately 2.5 Mgal/day; the Morgan well field (wells P through T) is in service, (P and S tap into the Farrington and usually only one of the two is in use at a given time), this field produces approximately 2M gal/day. Sayreville also purchaces 2M gal/day from Middlesex, and has four 11M gallon reserves. While water is not blended, Sayreville operates a circular system (interconnected) which serves approximately 38,000 people

DDM.

ACTION ITEMS:

The Bordentown wells are 3-4 miles from the site and serve 38.46% of Sayreville's customers; population served is 14,615.*

The Morgan wells are 1-2 miles from the site and serve 30.77% of Sayreville's customers; population served is 11,693.*

* These values were calculated based on pumpage

Note: Only 3 of the Morgan wells tap into the Old Bridge Sand aquifer; therefore the population served was recalculated => 8,770 people (75% of Morgan)

13

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J008	October 22, 1991	1138

DISTRIBUTION:

South Amboy Gas Works

BETWEEN:	OF:	PHONE:
Jerry Garnet	South Amboy Water Department	(908) 721-1211

AND:

Diane Minsavage (NUS)

DISCUSSION:

I called Mr. Garnet to ascertain the water service available in South Amboy. Mr. Garnet stated that while South Amboy has two shallow groundwater wells and a water treatment plant; however, they are currently not using the wells but are purchasing all of their water from Perth Amboy. The South Amboy Water Department serves approximately 8,000 people (7,800 plus "change").

DDM

ACTION ITEMS:

South Amboy wells "SAWD10" and "SAWD9A" are operational, although not in use.

NUS CORPORATION

TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-9001-10	2/21/90	9:15 AM

DISTRIBUTION:
File - Celotex (A)

BETWEEN:	OF:	PHONE:
Richard Muchanic	S. Amboy Water Dept	(201) ~~721~~-1211

AND: Maria Coler

DISCUSSION: (NUS)

I called Richard Muchanic ~~back~~ to get information on the two wells maintained by the S. Amboy Water Department. He gave me the following information:

1.) The wells tap the Oldbridge Aquifer Sands at 48 ft.
2.) The well permits numbers are 26-4812 and 26-4078
3.) The population served is 8500
4.) The wells are located at lower Broadway and the Public Works Compound of S. Amboy
5.) The water from the two wells is pumped into a reservoir where it receive pretreatment (PH; disinfection). It is then pumped to ~~a~~ water tower where it is mixed with water from Sayreville and Perth Amboy.
6.) In the case that the water from the wells is contaminated, Sayreville and Perth Amboy wells

ACTION ITEMS:

~~are~~ the alternative sources of water.
7.) A third well is permitted for South Amboy. However, this well hasn't been tapped in five years due to high levels of iron. These levels of iron are attributable to the composition of the aquifers.
8.) Mr. Muchanic also told me that he strictly

NUS 087 REVISED 0581

over.

adheres to the NJDEP mandate 208 which requires testing for 16 organics twice a year and inorganics (heavy metals, nitrates) every 2 years. The tests have so far come up negative. He said that his only worry is the possibility of salt water intrusion.

NUS CORPORATION AND SUBSIDIARIES | **TELECON NOTE**

CONTROL NO.: 02-9008-04	**DATE:** 9/25/90	**TIME:** 1520

DISTRIBUTION:
To File: NL Industries Titanium Pigment Plant
Re: Woodbridge Township Water Supply

BETWEEN: Joe Ritter	**OF:** Middlesex Water Co.	**PHONE:** (201) 634-1500

AND: Edmund Knyfd Jr. **(NUS)**

DISCUSSION:

Joe indicated that Woodbridge Township is served by wells and surface water. Areas of Woodbridge Twp north of Highway 27 are served by wells located near Spring Lake in South Plainfield. Areas south of Highway 27 are served by surface water withdrawal from the Delaware and Raritan Canal across from the Rutgers University campus. The 1980 census population for Woodbridge Township is approximately 90,100.

Edmund Knyfd Jr.
9/25/90

ACTION ITEMS:

17

WQL
02-9002-0

NUS CORPORATION AND SUBSIDIARIES

TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-9002-01 / NJDU$5	February 9, 1990	1305

DISTRIBUTION:

Revlon Inc.

BETWEEN:	OF:	PHONE:
Mr. Frank Falco	Middlesex Water Co.	(201) 634-1500

AND:

Sue Lenczyk

DISCUSSION:

I called Mr. Falco to confirm the locations of the Middlesex Water Co. supply wells.

He mentioned four well fields in South Plainfield: Spring Lake Street, Sprague Street, Maple Avenue, and Park Avenue; and two well fields in Edison: North Tingley Lane and South Tingley Lane.

In addition, there is the surface water intake along the Delaware and Raritan Canal.

ACTION ITEMS:

The information above supports the U.S.G.S. list of wells in Middlesex County but conflicts with info in the RCRA Facility Assessment prepared by the Bureau of Planning and Assessment, NJDEP, which states that the Middlesex Water Co. has a public supply well within 1.5 miles of the Revlon, Inc. site.

NUS 087 REVISED 0685

18

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.: 02-9008-04	DATE: 9/25/90	TIME: 1510

DISTRIBUTION: To File: NL Industries Titanium Pigment Plant

Re: Drinking Water Supply for Woodbridge Township

BETWEEN: Guy Leighton	OF: Woodbridge Twp. - Engineering	PHONE: (201) 388-9797

AND: Edmund Knyfd Jr. (NUS)

DISCUSSION:

Guy indicated that all the drinking water for Woodbridge Township is supplied by the Middlesex Water Company. He suggested calling them to get specific information about the location of the water supply.

Edmund Knyfd Jr.
9/25/90

ACTION ITEMS:

(19)

NUS CORPORATION AND SUBSIDIARIES

TELECON NOTE

CONTROL NO.:	DATE:	TIME:
02-9002-01 / NJDU	March 15, 1990	0815

DISTRIBUTION:

Revlon Inc.

BETWEEN:	OF:	PHONE:
Mr. Jay Elliot, chief Sanitary Inspector	Dept of Health and Human Resources Edison	(201) 287-0900 x 476

AND:

Sue Lenczyk

DISCUSSION: (NUS)

I asked Mr. Elliot about the computer sheets he had given me, listing the wells within a 3-mile radius of Revlon. I mentioned that some of the wells had the word "private" listed next to them, but that many of the wells had blanks next to them. He responded that the health department has information that wells are there, but it does not know for certain whether they are being used. They may be in use, they may not. To compile the computer sheets, the health department drew from different sources, including historical records kept by the NJDEP. Mr. Elliot said that the more information that is listed next to the well, the more likely that it is currently being used.

Mr. Elliot also informed me that they occasionally have requests to sample private wells for volatile organics. He said that they have yet to find a problem of contamination with volatile organics. He added that occasionally there seems to be a problem, but only

ACTION ITEMS:

with a newly drilled well. Those problems stemmed from improper methods of decontaminating equipment. When they resampled after equipment was properly decon'ed, the well samples came up clean.

Sue Lenczyk 3/15/90

2C

NUS CORPORATION AND SUBSIDIARIES

TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-9002-01/NJDU	March 19, 1990	0850

DISTRIBUTION:

Revlon Inc. (Page 1 of 2)

BETWEEN:	OF:	PHONE:
Mr. Jay Elliot, chief Sanitary Inspector	Edison Department of Health and Human Services	(201) 287-0900 x 476

AND:

Sue Lenczyk

DISCUSSION:

I asked Mr Elliot about the four public community wells listed on the computer printout of wells in Edison Township. He said that those wells are run by Edison Township and are not in use. I asked when they were last used, and he said "it has been quite some time." The wells are capped and available; they are not abandoned. During the water shortage a few years ago, the township had to develop a contingency plan in case of a more severe shortage. It was discovered that it would not be terribly difficult to get them back on line. However, as for now, they are in a field, the grass is mown around them, and they are not used.

I then inquired about the five public noncommunity wells. He said that the designation "public noncommunity" means a water supply that is not a public supply but is used by people other than just the residents. One belongs to the Roosevelt Hotel;

ACTION ITEMS:

another is used by Roosevelt Hospital. The one at the hospital is used daily. The hospital does use public supply from Middlesex Water Company, but in the mornings and evenings when water pressure is low due to heavy use, the 500-foot-deep well used by the hospital will kick in automatically. Two other wells belong

(continued on page 2)

NUS CORPORATION AND SUBSIDIARIES

TELECON NOTE

CONTROL NO:	DATE:	TIME:
02-9002-01/NJDU	March 19, 1990	0850

DISTRIBUTION:
Revlon Inc. (Page 2 of 2)

BETWEEN:	OF:	PHONE:
Mr. Jay Elliot	Edison Health Dept.	(201) 287-0900 x 476

AND:
Sue Lenczyk

DISCUSSION:

to swim clubs and are used seasonally. Water from the wells is used for the pool, the concession stands, and the showers. There is another well used by a Baptist church (used on Wednesday nights and Sundays). One well is being added to this designation of public noncommunity: a house at the corner of Brunswick and Plainfield Avenues has been converted to a real estate office.

My final question to Mr. Elliot was whether the people drinking from private wells have the capability of having a hookup with the community supply. He said yes - in virtually every case. He said that at least 95 percent (and that is probably a low estimate) have the option to tie in with the municipal water system.

ACTION ITEMS:

NUS CORPORATION TELECON NOTE

CONTROL NO: 02-8512-01	DATE: 6/19/86	TIME: 1120

DISTRIBUTION: File (Heller Properties)

BETWEEN: City Engineer	OF: Township of Edison	PHONE: (201) 287-0900

AND: D. LAMOND (NUS)

DISCUSSION:

Water supply for Edison. There are several public supply wells located in Edison however they are not utilized except in an emergency as backup supplies. Water Dept in Edison just distributes water from the Elizabethtown Water Co. There are other wells in area (private wells) which are used for irrigation ~~and~~, industry and monitoring.

ACTION ITEMS:

2

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
02-9001-10	August 30, 1990	2:40

DISTRIBUTION:

File - Celotex (A)

BETWEEN:	OF:	PHONE:
Mr. Garnett	S. Amboy Water Dept.	(201) 721-1211

AND:

Bob Cantagallo (NUS)

DISCUSSION:

Mr Garnett informed me that J. McKeon receives water from the South Amboy Water company

ACTION ITEMS:

NUS 067 REVISED 0685

24

0000
02-9004-17

NUS CORPORATION AND SUBSIDIARIES — TELECON NOTE

CONTROL NO.: 02 - 9004-17
DATE: July 11, 1990
TIME: 4:10

DISTRIBUTION:
Arthur Kill Urban Industrial Park
$475NJGFIS

BETWEEN: Mrs. Ciraky
OF: 65 Jenson Ave. Fords, New Jersey
PHONE: (201) 738-0898

AND: Bruce Sanders (NUS)

DISCUSSION:
Spoke to Mrs. Ciraky concerning the potable groundwater well located on her property. She stated that the well has not been used for several years now. She said the well caved in and it has not been repaired.

ACTION ITEMS:

REFERENCE NO. 17

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J061	02/14/92	11:30

DISTRIBUTION:
- Tooley's Garage
- Staff

BETWEEN:	OF:	PHONE:
Dan Van Abs	NJDEPE, Bureau of Water Supply Planning	(609) 633-1179

AND: K. Campbell (NUS)

DISCUSSION:

Mr. Van Abs returned my call of 02/13/92, and provided the following information on Wellhead Protection Area (WHPA) delineation for the State of New Jersey:

- WHPAs are not yet delineated for the state. The Bureau of Water Supply Planning is working on a draft delineation (a multi-year process).

Mr. Van Abs will put HNEC on their mailing list to receive updates on WHPA regulations.

ACTION ITEMS:

K. Campbell 02/14/92

REFERENCE NO. 18

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

TABLE 3-6.—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity [a] (cm/sec)
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks	10^{-8}
Silt; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}
Sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-4}
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}

[a] Do not round to nearest integer.

TABLE 3-7.—TRAVEL TIME FACTOR VALUES [a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s) [b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in Table 3-1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in Table 3-1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in Table 3-1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from Table 3-8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3-8.—GROUND WATER MOBILITY FACTOR VALUES [a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst [c]	≤10	>10 to 1,000	>1,000
Present as liquid [b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-5}
Greater than 0.01 to 1	0.002	0.002	[illegible]	2×10^{-7}
Less than or equal to 0.01	2×10^{-5}	2×10^{-5}	[illegible]	2×10^{-9}

[a] Do not round to nearest integer.

[b] Use if the hazardous substance is present or deposited as a liquid.

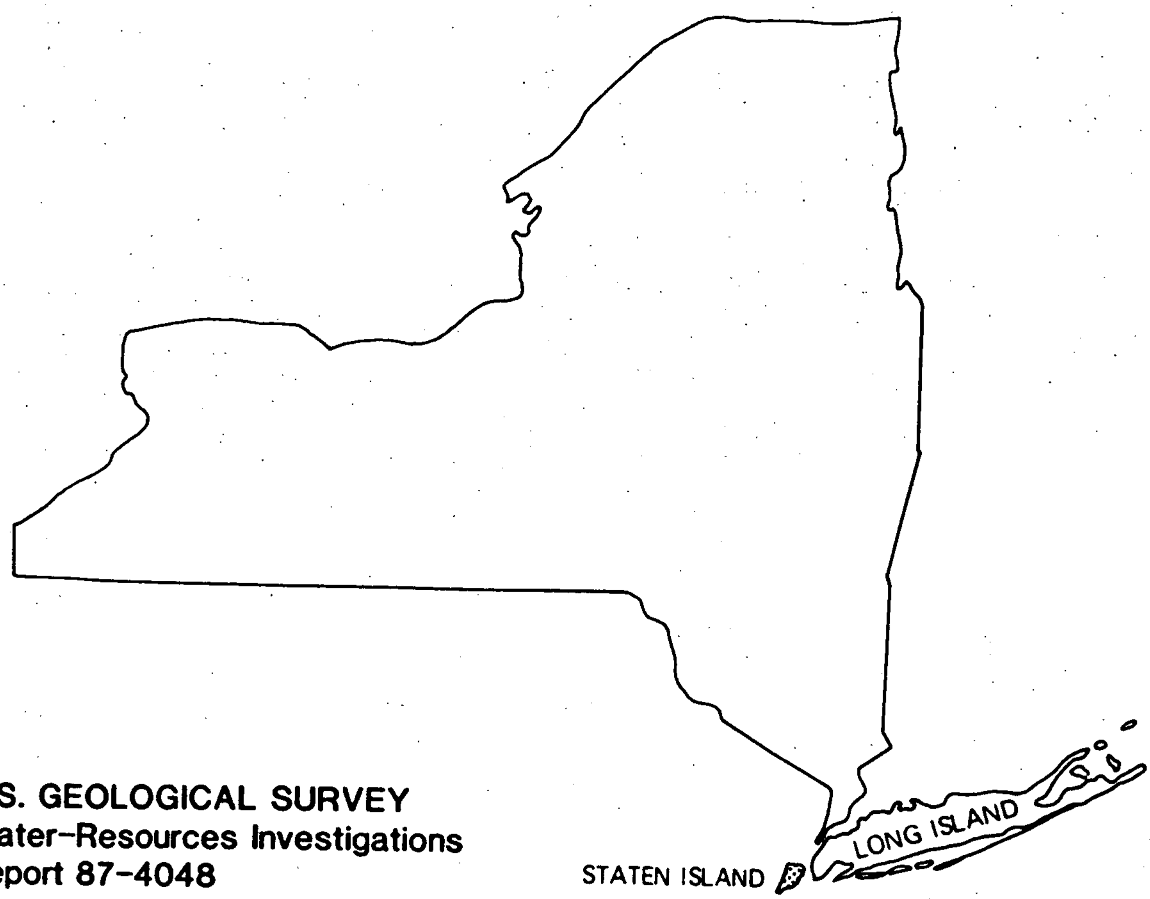
[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

REFERENCE NO. 19


FOUR MILE VICINITY MAP
TITLE:
SITE NAME:
E L BETH LTD
PERTH AMBOY, N.J.
DATE: 03-16-92
SCALE: 1" = 2000'
REPORT NUMBER: JO30
USGS TOPO NAME:
PERTH AMBOY, N.J.
SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
N
WOODBRIDGE
PERTH AMBOY
EL BETH SITE
SAYREVILLE
South Amboy
RARITAN RIVER
RARITAN BAY
South Amboy Public Wells
RARITAN
ARTHUR KILL
Tottenville
Princes Bay
Great Fresh Kills
Fresh Kills
Round Shoal
Laurence Harbor
Morgan Beach
Seidler Beach
Raritan Bay Beach
Cliffwood Beach
Huguenot Beach
NEW YORK
NEW JERSEY
RICHMOND CO
MIDDLESEX CO
MONMOUTH CO
GREAT BEDS
Great Beds Lighthouse

REFERENCE NO. 20

Geologic and Geohydrologic Reconnaissance of Staten Island, New York



U.S. GEOLOGICAL SURVEY
Water-Resources Investigations
Report 87-4048

Prepared in cooperation with the

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

GEOLOGIC AND GEOHYDROLOGIC RECONNAISSANCE

OF STATEN ISLAND, NEW YORK

by Julian Soren

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations
Report 87-4048

Prepared in cooperation with the

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Syosset, New York

1988

GEOLOGIC AND GEOHYDROLOGIC RECONNAISSANCE OF STATEN ISLAND, NEW YORK

by Julian Soren

ABSTRACT

Staten Island (Richmond County) is a mainly suburban borough of the City of New York in which considerable interest in ground water has grown as a result of protracted droughts that seriously reduced the City's water supply from its upstate surface-reservoir system in the 1960's and 1980's. Hundreds of residents and business installed wells, mainly for lawn and plant-nursery irrigation, filling swimming pools, and vehicle washing, because the City prohibited use of the public-water supply for such purposes during the droughts.

Fresh ground water is available from Upper Proterozoic to Lower Jurassic bedrock and from overlying unconsolidated sandy Upper Cretaceous and upper Pleistocene deposits. The principal source of fresh ground-water recharge is precipitation that infiltrates the land surface and percolates to the water table. Fresh ground water moves downward and laterally through the unconsolidated deposits and bedrock toward discharge points--streams and tidewater that surround the island and saline ground-water that underlies it at depth.

Four maps of Staten Island's geology and water-table levels provide information on ground-water availability and serve as a basis for future ground-water investigations.

Streamflow on Staten Island has not been noticeably reduced by current ground-water development, which indicates that the ground-water reservoir has not been significantly depleted and that considerably more ground water is available for use.

INTRODUCTION

Richmond County, commonly known as Staten Island, a borough of the City of New York, has had less hydrogeologic study than the City's other four boroughs because it is the least populated and most recently developed.

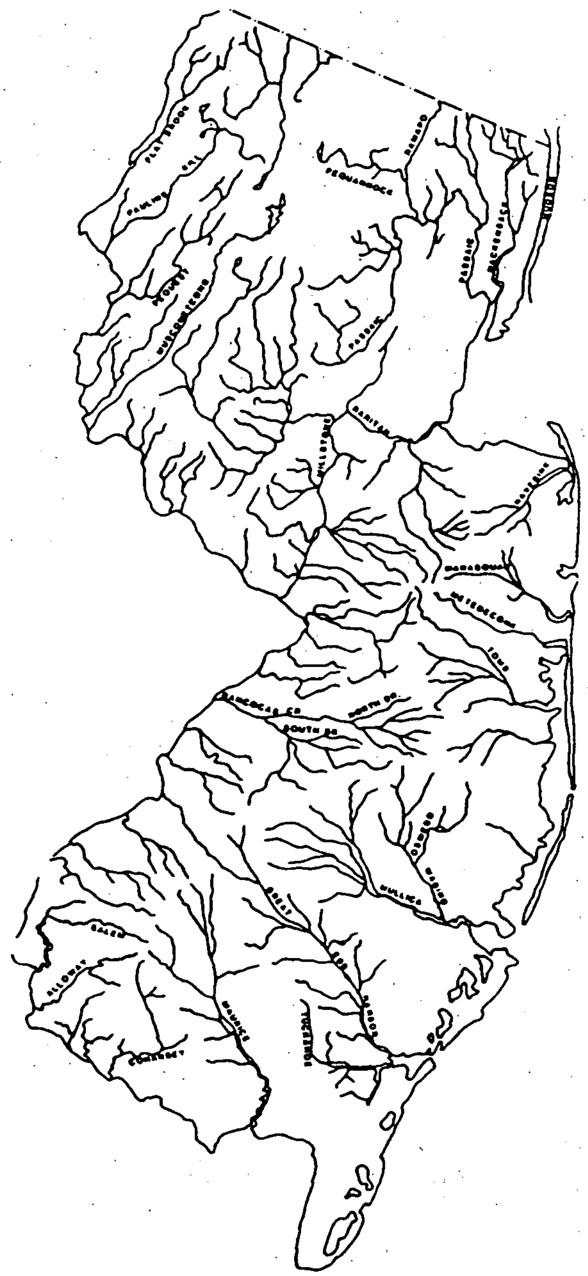
Public water supply for Staten Island has been provided entirely by New York City's surface-reservoir system in upstate New York since 1971. During 1917-70, from 96 to 67 percent of the water was from upstate reservoirs; the rest was supplied by several municipally owned wells on the island. The amount pumped locally depended on the adequacy of the upstate reservoirs' reserves during drought periods. Before 1917, water from individual wells, from municipal wells, and from privately owned water-company wells, in addition to small, local surface reservoirs, supplied the water needs of Staten Island's population, which was significantly less than the 116,500 stated in the U.S. Census of 1920.

REFERENCE NO. 21

Let's protect our earth

Surface Water Quality Standards

N.J.A.C. 7:9-4.1 et seq.



AUGUST 1989

New Jersey Department of Environmental Protection

Division of Water Resources

National/State Parks and Wildlife Refuges and waters of exceptional recreational or ecological significance) as designated in N.J.A.C. 7:9-4.15(i).

"Persistent" means relatively resistant to degradation, generally having a half life of over 96 hours.

"Pinelands waters" means all waters within the boundaries of the Pineland Area, except those waters designated as FW1 in this subchapter, as established in the Pinelands Protection Act N.J.S.A. 13:18A-1 et seq., and shown on Plate 1 of the "Comprehensive Management Plan" adopted by the New Jersey Pinelands Commission in November 1980.

"PL" means the general surface water classification applied to Pinelands Waters.

"Primary contact recreation" means recreational activities that involve significant ingestion risks and includes, but is not limited to, wading, swimming, diving, surfing, and water skiing.

"Public hearing" means a legislative type hearing before a representative or representatives of the Department providing the opportunity for public comment, but does not include cross-examination.

"River mile" means the distance, measured in statute miles, between two locations on a stream, with the first location designated as mile zero. Mile zero for the Delaware River is located at the intersection of the centerline of the navigation channel and a line between the Cape May Light, New Jersey, and the tip of Cape Henlopen, Delaware.

"Saline waters" means waters having salinities generally greater than 3.5 parts per thousand at mean high tide.

"SC" means the general surface water classification applied to coastal saline waters.

→ "SE" means the general surface water classification applied to saline waters of estuaries.

"Secondary contact recreation" means recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

"Shellfish" means those mollusks commonly known as clams, oysters, or mussels.

"Shellfish waters" means waters classified as Approved, Seasonally Approved, Special Restricted, Seasonally Special Restricted or Condemned that support or possess the potential to support shellfish which are within the Coastal Area Facility Review Act (C.A.F.R.A.) zone as delineated in 1973, (excluding: 1 - The Cohansey River upstream of Brown's Run; 2 - The Maurice River upstream of Route 548;

1. It is demonstrated to the satisfaction of the Department that the waters should be set aside to represent the natural aquatic environment and its associated biota; or

2. It is demonstrated to the satisfaction of the Department that a more restrictive use is necessary to protect a unique ecological system or threatened/endangered species.

(g) In those cases in which a thermal discharge is involved, the procedures for reclassifying segments for more restrictive uses shall be consistent with section 316 of the Federal Clean Water Act.

7:9-4.12 Designated uses of FW1, PL, FW2, SE1, SE2, SE3, and SC Waters

(a) In all FW1 waters the designated uses are:

1. Set aside for posterity to represent the natural aquatic environment and its associated biota;

2. Primary and secondary contact recreation;

3. Maintenance, migration and propagation of the natural and established aquatic biota; and

4. Any other reasonable uses.

(b) In all PL waters the designated uses are:

1. Cranberry bog water supply and other agricultural uses;

2. Maintenance, migration and propagation of the natural and established biota indigenous to this unique ecological system;

3. Public potable water supply after such treatment as required by law or regulations;

4. Primary and secondary contact recreation; and

5. Any other reasonable uses.

(c) In all FW2 waters the designated uses are:

1. Maintenance, migration and propagation of the natural and established biota;

2. Primary and secondary contact recreation;

3. Industrial and agricultural water supply;

4. Public potable water supply after such treatment as required by law or regulation; and

5. Any other reasonable uses.

(d) In all SE1 waters the designated uses are:

1. Shellfish harvesting in accordance with N.J.A.C. 7:12;

2. Maintenance, migration and propagation of the natural and established biota;

3. Primary and secondary contact recreation; and

4. Any other reasonable uses.

(e) In all SE2 waters the designated uses are:

1. Maintenance, migration and propagation of the natural and established biota;

2. Migration of diadromous fish;

3. Maintenance of wildlife;

4. Secondary contact recreation; and

5. Any other reasonable uses.

(f) In all SE3 waters the designated uses are:

1. Secondary contact recreation;

2. Maintenance and migration of fish populations;

3. Migration of diadromous fish;

4. Maintenance of wildlife; and

5. Any other reasonable uses.

(g) In all SC waters the designated uses are:

1. Shellfish harvesting in accordance with N.J.A.C. 7:12;

2. Primary and secondary contact recreation;

3. Maintenance, migration and propagation of the natural and established biota; and

4. Any other reasonable uses.

(e) The surface water classifications in Table 3 are for waters of the Passaic, Hackensack and New York Harbor Complex Basin:

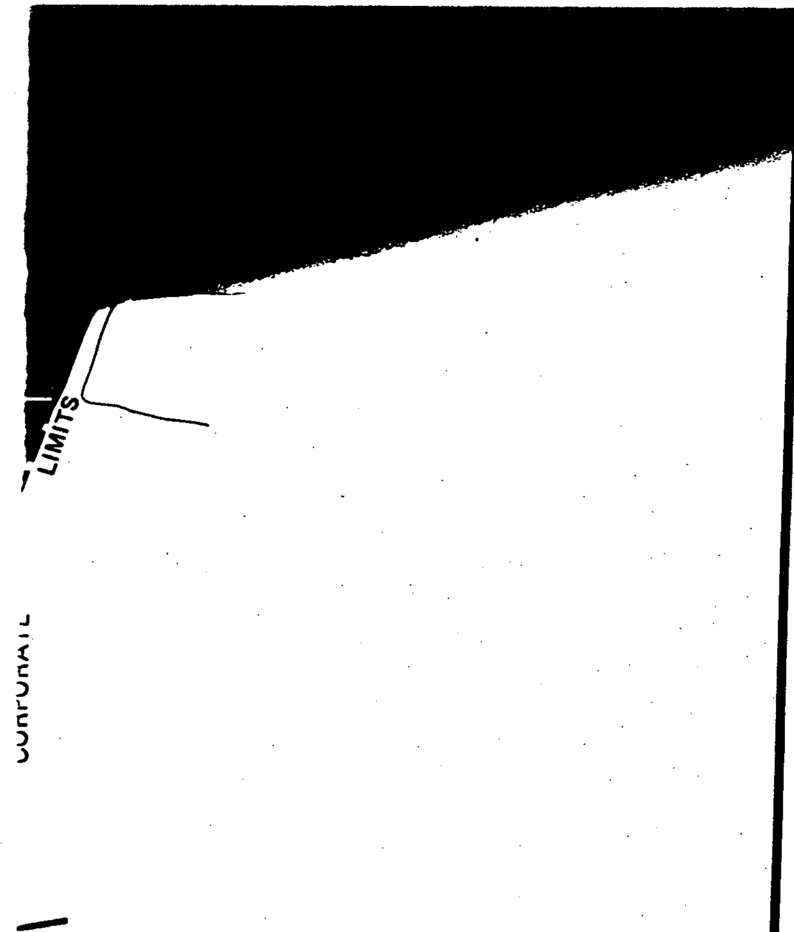
TABLE 3

WATER BODY	CLASSIFICATION
ARTHUR KILL	
(Perth Amboy) - The Kill and its saline New Jersey tributaries between the Outerbridge Crossing and a line connecting Ferry Pt., Perth Amboy to Wards Pt., Staten Island, New York	SE2
(Elizabeth) - From an east-west line connecting Elizabethport with Bergen Pt., Bayonne to the Outerbridge Crossing	SE3
(Woodbridge) - All freshwater tributaries	FW2-NT
BEAR SWAMP BROOK (Mahwah) - Entire length	FW2-TP(C1)
BEAR SWAMP LAKE (Ringwood)	FW2-NT(C1)
BEAVER BROOK	
(Meriden) - From Splitrock Reservoir Dam downstream to Meriden Road Bridge	FW2-TM
(Denville) - Meriden Road Bridge to Rockaway River	FW2-NT
BEECH BROOK	
(West Milford) - From State line downstream to Wanaque River	FW2-TM
BELCHER CREEK (W. Milford) - Entire length	FW2-NT
BERRYS CREEK (Secaucus) - Entire length	FW2-NT/SE2
BLACK BROOK	
(Meyersville) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Segment and tributaries within the Great Swamp National Wildlife Refuge	FW2-NT(C1)
BLUE MINE BROOK	
(Wanaque) - Entire length, except segment described below	FW2-TM
(Norvin Green State Forest) - That portion of the stream and any tributaries within the Norvin Green State Forest	FW2-TM(C1)
BRUSHWOOD POND (Ringwood)	FW2-TM(C1)
BUCKABEAR POND (Newfoundland) - Pond, its tributaries and connecting stream to Clinton Reservoir	FW2-NT(C1)
BURNT MEADOW BROOK (Stonetown) - Entire length	FW2-TP(C1)
CANISTEAR RESERVOIR (Vernon)	FW2-TM
CANISTEAR RESERVOIR TRIBUTARY (Vernon) - The southern branch of the eastern tributary to the Reservoir	FW1
CANOE BROOK (Chatham) - Entire length	FW2-NT

Oceanport	
(Oceanport) - Creek downstream of line described above	SE1(C1)
PARKERS CREEK	
(Fort Monmouth) - Source to a line beginning on the easternmost extent of Horseneck Point and bearing approximately 000 degrees T (True North) to its terminus on Breezy Point on the Little Silver side (north) side of the creek.	FW2-NT/SE1
(Fort Monmouth) - Creek downstream of line described above	SE1(C1)
PEAPACK BROOK (Gladstone) - Entire length	FW2-TP(C1)
PETERS BROOK (Somerville) - Entire length	FW2-NT
PIGEON SWAMP (S. Brunswick) - All waters within the boundaries of Pigeon Swamp State Park	FW2-NT(C1)
PIKE RUN (Belle Meade) - Entire length	FW2-NT
PINE BROOK (Clarks Mills) - Entire length	FW2-NT
PINE BROOK (Cooks Mill) - Entire length	FW2-TM
PLEASANT RUN (Readington) - Entire length	FW2-NT
PRESCOTT BROOK (Stanton Station) - Entire length	FW2-TM
RAMANESSIN (HOP) BROOK (Holmdel) - Entire length	FW2-TM
RARITAN BAY - Entire drainage	FW2-NT/SE1
RARITAN RIVER	
NORTH BRANCH (Also see INDIA BROOK)	
(Pleasant Valley) - Source to, but not including, Ravine Lake	FW2-TP(C1)
(Far Hills) - Ravine Lake dam to Rt. 512 bridge	FW2-TM
(Bedminister) - Rt. 512 bridge to confluence with South Branch, Raritan River	FW2-NT
SOUTH BRANCH RARITAN RIVER	
(Mt. Olive) - Source to the dam that is 390 feet upstream of the Flanders-Drakestown Road bridge	FW2-NT(C1)
(Mt. Olive) - Dam to confluence with Turkey Brook	FW2-TM(C1)
(Naughright) - Confluence with Turkey Brook to confluence with Electric Brook	FW2-TP(C1)
(Clinton) - Confluence with Electric Brook to downstream end of Packers Island, except segment described separately, below	FW2-TM
(Ken Lockwood Gorge) - River and tributaries within Ken Lockwood Gorge Wildlife Management Area	FW2-TM(C1)
(Neshanic Sta.) - Downstream end of Packers Island to confluence with North Branch, Raritan River	FW2-NT
MAIN STEM RARITAN RIVER	
(Bound Brook) - From confluence of North	FW2-NT

and South Branches to Landing Lane bridge in New Brunswick and all freshwater tributaries downstream of Landing Lane bridge.	
(Sayreville) - Landing Lane bridge to Raritan Bay and all saline water tributaries	SE1
RINEHART BROOK (Hacklebarney) - Entire length	FW2-TP(C1)
ROCK BROOK (Montgomery) - Entire length	FW2-NT
ROCKAWAY CREEK	
NORTH BRANCH	
(Mountainville) - Source to Rt. 523 bridge	FW2-TP(C1)
(Whitehouse) - Rt. 523 bridge to confluence with South Branch	FW2-TM
SOUTH BRANCH (Whitehouse) - Entire length	FW2-TM
MAIN STEM (Whitehouse) - Confluence of North and South Branches to Lamington River	FW2-NT
ROUND VALLEY RESERVOIR (Clinton)	FW2-TM
ROYCE BROOK (Manville) - Entire length	FW2-NT
SHREWSBURY RIVER	
(Little Silver) - Source to Rt. 36 highway bridge	SE1(C1)
(Highlands) - Rt. 36 bridge to Sandy Hook bay	SE1
SIMONSON BROOK (Griggstown) - Entire length	FW2-NT
SIX MILE RUN	
(Franklin Church) - Entire length, except segment described below	FW2-NT
(Hillsborough) - Segment within the boundaries of Six Mile Run State Park	FW2-NT(C1)
SOUTH RIVER	
(Old Bridge) - Duhernal Lake to intake of the Sayreville Water Department	FW2-NT
(Sayreville) - Below the intake of the Sayreville Water Department	SE1
SPOOKY BROOK (Bound Brook)	FW2-NT
SPRUCE RUN	
(Glen Gardner) - Source to, but not including, Spruce Run Reservoir	FW2-TP(C1)
(Clinton) - Spruce Run Reservoir dam to Raritan River, South Branch	FW2-TM
SPRUCE RUN RESERVOIR (Union) - Reservoir and tributaries	FW2-TM(C1)
STONY BROOK (Washington) - Entire length	FW2-TP(C1)
STONY BROOK	
(Hopewell) - Entire length, except that segment described below	FW2-NT
(Syndertown) - Brook and tributaries within Amwell Lake Wildlife Management Area	FW2-NT(C1)
STONY BROOK (Watchung) - Entire length	FW2-NT
SUN VALLEY BROOK (Mt Olive) - Entire length	FW2-TP(C1)
SWIMMING RIVER	
(Red Bank) - Source to the intake of the	FW2-NT

REFERENCE NO. 22



APPROXIMATE SCALE

600 0 600 FEET

ith Washington Street, flush with ground, between curb and

side of Garfield Fire Station, 11 feet northeast of northwest

along east boundary of Alpine Cemetery in Perth Amboy, 42
e 628 PAY, 8.4 feet west of west edge of west sidewalk along

venue, located on northeast corner near curb and 0.45 foot

35 and Brace Avenue, set in brick wall of City Stable at east
, stamped 389-D, set vertically.

440, level with curb.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF

PERTH AMBOY, NEW JERSEY

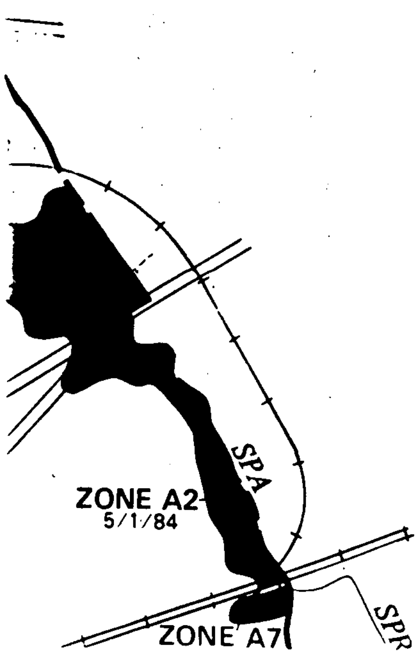
MIDDLESEX COUNTY

ONLY PANEL PRINTED

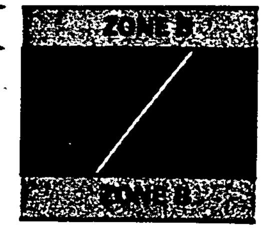
COMMUNITY-PANEL NUMBER
340272 0001 C

MAP REVISED:
May 1, 1984

Federal Emergency Management Agency



KEY TO MAP



500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With
Date of Identification
e.g., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet**	~~~513~~~
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	— — —
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

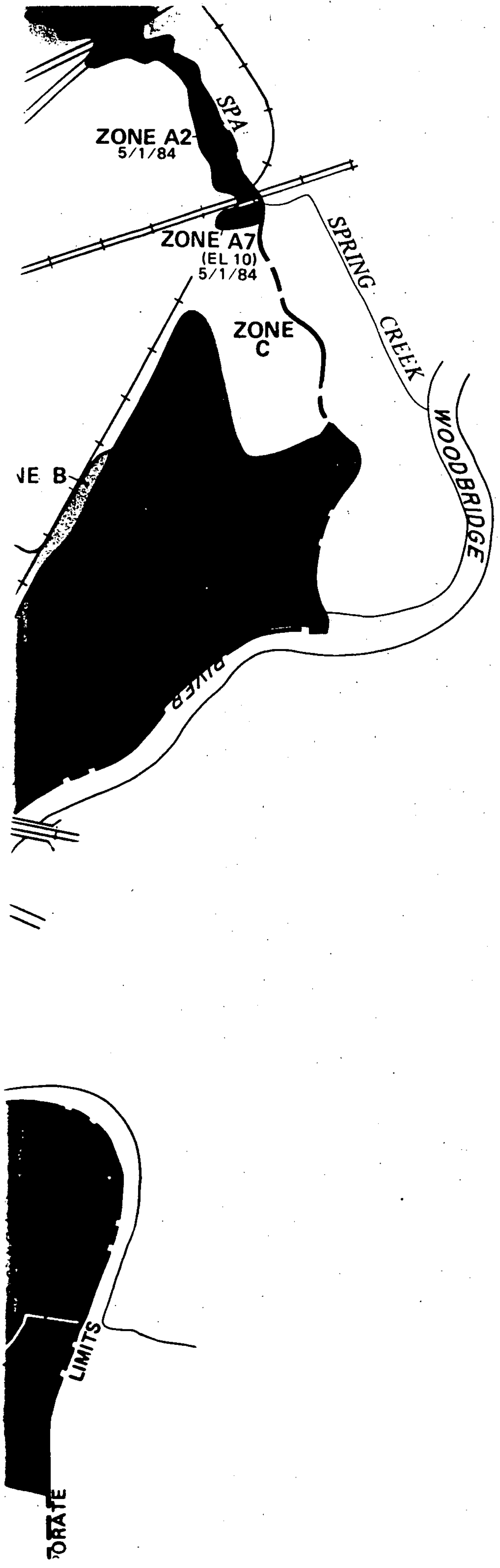
*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance and flood plain management purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. The coastal flooding elevations shown may differ significantly from those developed by the National Weather Service for hurricane evacuation planning.



may be protected by flood control structures.

This map is for flood insurance and flood plain management purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas. The coastal flooding elevations shown may differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Coastal base flood elevations shown on this map include the effects of wave action.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

INITIAL IDENTIFICATION:
JUNE 21, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
JUNE 4, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE:
DECEMBER 18, 1979

FLOOD INSURANCE RATE MAP REVISIONS:
May 1, 1984-to add base flood elevations, to change special flood hazard areas, to add the effects of wave action

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

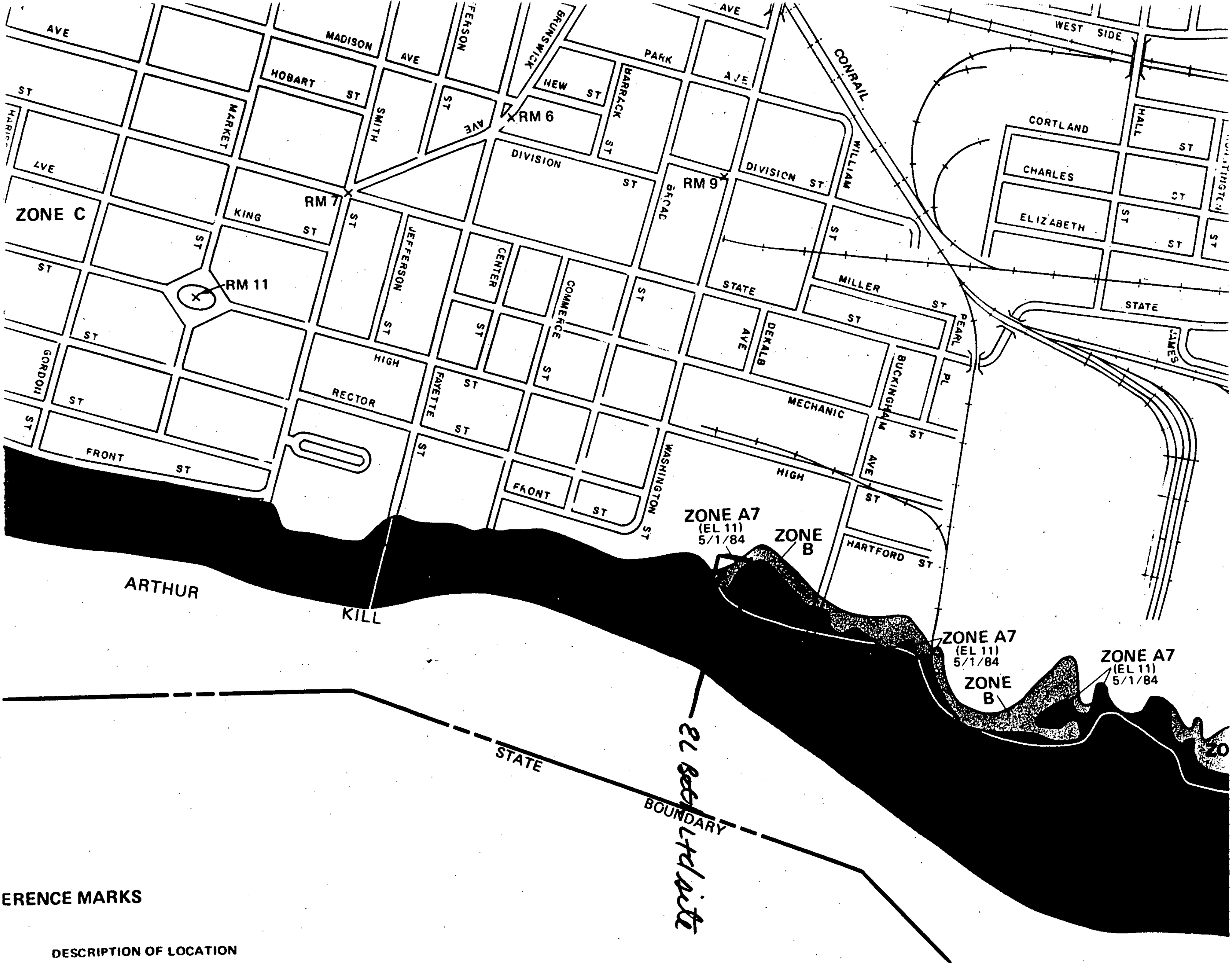
N

APPROXIMATE SCALE

600 0 600 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP



ERENCE MARKS

DESCRIPTION OF LOCATION

REFERENCE NO. 23


NATIONAL WETLANDS INVENTORY
UNITED STATES DEPARTMENT OF THE INTERIOR
LOWER BAY
RARITAN BAY
LOWER NEW YORK BAY
SANDY HOOK BAY
15-Mile surface water Limit
SCALE 1:24 000
Other information concerning the wetland resources depicted on this document may be available. For information, contact:
Regional Director (ARDE) Region V
U.S. Fish and Wildlife Service
1 Gateway Center, Suite 700
Newton Corner, Massachusetts 01258
SPECIAL NOTE
This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with Classification of Wetlands and Deep-Water Habitats of the United States (An Operational Draft), Cowardin, et al, 1977. The aerial photographs typically reflect conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.
Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.
SYMBOLOGY EXAMPLE
SYSTEM
SUBSYSTEM
CLASS
E2EM5N
SUBCLASS, WATER REGIME
UPLAND (NON-WETLANDS)
Pf or Pkf FARMED WETLANDS
CONTROLLED WATER REGIME
NOTES TO THE USER
Wetlands which have been field examined are indicated on the map by an asterisk (*).
Dominance type (either vegetative or sedentary animal) can be added to the map by the interested user.
Additions or corrections to the wetlands information displayed on this map are solicited. Please forward such information to the address indicated.
AERIAL PHOTOGRAPHY
DATE: 10 / 76
SCALE: 1:80 000
TYPE: B-W
U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Prepared by Office of Biological Services for the National Wetlands Inventory
NUS CORP.
** REFERENCE MATERIAL **
DO NOT FOLD, DRAW ON, MUTILATE IN ANY WAY. COPIES CAN BE MADE IN DRAFTING.
DATE: 7/90
WETLAND LEGEND
U – Primarily represents upland areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.
E – ESTUARINE
M – MARINE
P – PALUSTRINE
L – LACUSTRINE
R – RIVERINE
MODIFYING TERMS
TITLE: 15 MILE SURFACE WATER PATHWAY MAP
SITE NAME: E L BETH LTD
PERTH AMBOY , N.J.
DATE: 03-16-92
SCALE: 1" = 2000'
REPORT NUMBER: JO30
USGS TOPO NAME: PERTH AMBOY, N.J.
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1972

REFERENCE NO. 24

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth Ltd file
DATE: March 27, 1992
FROM: Claire Baranko
COPIES: —
SUBJECT: Sensitive Environments located along the 15-mile surface water Route
~~REFERENCE:~~ Downstream of the EL Beth Site, Perth Amboy, New Jersey.
(References noted below).

• Correspondence sent by the U.S. Department of the Interior Fish and Wildlife Service to HNUS on March 11, 1992 reports that a federally-listed endangered bird species is documented as nesting and as having successfully fledged young at the Arthur Kill. Additionally, this species is documented to be using emergent wetlands located along the Raritan River. This letter also documents a federally (Priority) protected wetland area.

• Based upon Atlantic Coast Ecological Inventory Mapping, (Newark Sheet) the Shortnose sturgeon, a N.J. state-listed endangered species, is found in coastal waters depicted in the Newark Sheet. It may, therefore, be present at the Arthur Kill, as well as at the surface waters farther downstream.

This mapping also indicates the presence of the Great Blue Heron at Sandy Hook Bay; the breeding population of this species is considered endangered or threatened in New Jersey.

• Wetlands located along the 15-mile surface water route downstream of the EL Beth site include, according to the U.S. Fish and Wildlife Service National Wetlands Inventory Mapping:

- At Raritan Bay: Estuarine Intertidal Emergent wetland, 0.85 mile.
  Estuarine Intertidal Scrub Shrub (Broad leaved deciduous)/Emergent wetland, 0.60 mile
  Palustrine Scrub/shrub (Broad leaved deciduous)/Emergent wetlands, 0.22 mile.

b) At Sandy Hook Bay:
Estuarine Intertidal Scrub/Shrub (Broad leaved deciduous)/Emergent, 0.72 mile.
· Estuarine Intertidal Emergent wetland, 1.01 mile.

· Estuarine Intertidal Aquatic Bed wetland, 0.52 mile.

c) At the Raritan River
- Estuarine Intertidal Emergent wetland, 2.13 miles
· Federally protected (Priority) wetlands: approximately 2 miles
d) At Arthur Kill, upstream of EL Beth site (tidal area)
- Estuarine intertidal Emergent wetland, 0.21 mile

Total wetland frontage along the E.L. Beth 15-mile surface water route (sum of above values) is 6.26 miles.

ENDANGERED AND THREATENED WILDLIFE OF NEW JERSEY

Endangered Species are those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination. Assistance is needed to prevent future extinction in New Jersey.

Threatened Species are those who may become endangered if conditions surrounding them begin to or continue to deteriorate.

BIRDS

Endangered

Pied-billed Grebe,* *Podilymbus podiceps*
Bald Eagle, *Haliaeetus leucocephalus***
Northern Harrier,* *Circus cyaneus*
Cooper's Hawk, *Accipiter cooperii*
Red-shouldered Hawk, *Buteo lineatus* (Breeding)
Peregrine Falcon, *Falco peregrinus***
Piping Plover, *Charadrius melodus***
Upland Sandpiper, *Bartramia longicauda*
Roseate Tern, *Sterna dougallii*
Least Tern, *Sterna antillarum*
Black Skimmer, *Rynchops niger*
Short-eared Owl,* *Asio flammeus*
Sedge Wren, *Cistothorus platensis*
Loggerhead Shrike, *Lanius ludovicianus*
Vesper Sparrow, *Pooecetes gramineus*
Henslow's Sparrow, *Ammodramus henslowii*

Threatened

American Bittern*, *Botaurus lentiginosos*
Great Blue Heron*, *Ardea herodias*
Little Blue Heron, *Egretta caerulea**
Yellow-crowned Night Heron, *Nyctanassa violaceus*
Osprey, *Pandion haliaetus*
Northern Goshawk, *Accipiter gentilis*
Red-shouldered Hawk, *Buteo lineatus* (Non-breeding)
Black Rail, *Laterallus jamaicensis*
Long-eared Owl, *Asio otus*
Barred Owl, *Strix varia*
Red-headed Woodpecker, *Melanerpes erythrocephalus*
Cliff Swallow,* *Hirundo pyrrhonota*
Savannah Sparrow, *Passerculus sandwichensis*
Ipswich Sparrow, *Passerculus sandwichensis princeps*
Grasshopper Sparrow, *Ammodramus savannarum*
Bobolink, *Dolichonyx oryzivorus*

*Only breeding population considered endangered or threatened
**Federally endangered or threatened

REPTILES

Endangered

Bog Turtle, *Clemmys muhlenbergi*
Atlantic Hawksbill, *Eretmochelys imbricata***
Atlantic Loggerhead, *Caretta caretta***
Atlantic Ridley, *Lepidochelys kempi***
Atlantic Leatherback, *Dermochelys coriacea***
Corn Snake, *Elaphe g. guttata*
Timber Rattlesnake, *Crotalus h. horridus*

Threatened

Wood Turtle, *Clemmys insculpta*
Atlantic Green Turtle, *Chelonia mydas***
Northern Pine Snake, *Pituophis m. melanoleucus*

**Federally endangered or threatened

ENDANGERED AND NONGAME SPECIES PROGRAM

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY
DIVISION OF FISH, GAME AND WILDLIFE

AMPHIBIANS

Endangered

Tremblay's Salamander, *Ambystoma tremblayi*
Blue-spotted Salamander, *Ambystoma laterale*
Eastern Tiger Salamander, *Ambystoma t. tigrinum*
Pine Barrens Treefrog, *Hyla andersonii*
Southern Gray Treefrog, *Hyla chrysoscelis*

Threatened

Long-tailed Salamander, *Eurycea longicauda*
Eastern Mud Salamander, *Pseudotriton montanus*

MAMMALS

Endangered

Bobcat, *Lynx rufus*
Eastern Woodrat, *Neotoma floridana*
Sperm Whale *Physeter, macrocephalus***
Fin Whale, *Balaenoptera physalus***
Sei Whale, *Balaenoptera borealis***
Blue Whale, *Balaenoptera musculus***
Humpback Whale, *Megaptera novaeangliae***
Black Right Whale, *Balaena glacialis***

INVERTEBRATES

Endangered

Mitchell's Satyr (butterfly), *Neonympha m. mitchellii***
Northeastern Beach Tiger Beetle, *Cicindela d. dorsalis*
American Burying Beetle, *Nicrophorus americanus***
Dwarf Wedge Mussel, *Alasmidonta heterodon***

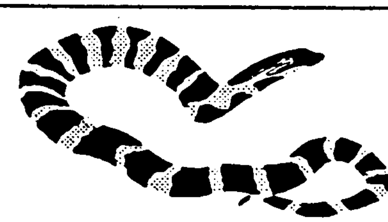
**Federally endangered

FISH

Endangered

Shortnose Sturgeon, *Acipenser brevirostrum***

List revisions:
March 29, 1979
January 17, 1984
May 6, 1985
July 20, 1987
June 3, 1991



ENDANGERED AND NONGAME SPECIES PROGRAM
GO WILD FOR WILDLIFE
CHECK-OFF N.J. Income Tax Conservation Fund
N.J. Division Fish-Game-Wildlife

The lists of New Jersey's endangered and nongame wildlife species are maintained by the DEP&E's Division of Fish, Game and Wildlife's, Endangered and Nongame Species Program. These lists are used to determine protection and management actions necessary to insure the survival of the State's endangered and nongame wildlife. This work is made possible only through voluntary contributions received through the Wildlife Check-off on the New Jersey State Tax Form. The Wildlife Check-off is the only major funding source for the protection and management of the State's endangered and nongame wildlife resource. For more information about the Endangered and Nongame Species Program or to report a sighting of endangered or threatened wildlife contact: Endangered and Nongame Species Program, Northern District Office, Box 383 R.D. 1, Hampton, N.J. 08827 or call (908) 735-8975.

in RED(F) or (S) indicates species protected by Federal or State Legislation (see text)

SYMBOL	SPECIES
	PLANTS (301-350)
	301 Eastern hemlock
	302 Spleenwort (S)
	303 Spider lily (S)
	304 Pond bush (S)
	305 Watermilfoil (S)
	306 Hooded pitcher plant (S)
	307 Tree
	308 Prickly pear cactus (S)
	309 Trailing arbutus (S)
	310 Eastern bumelia
	311 Pitcher plant
	312 Baldcypress
	313 Redbay
	314 Seaside alder
	315 Box huckleberry
	316 Purple fringeless orchid
	317 Pink lady's slipper
	318 Ebony spleenwort (S)
	319 Orchids (S)
	320 Golden club (S)
	321 Florida beargrass
	322 East-coast coontie
	323 Fall-flowering ixia
	324 Jackson-vine
	325 Spoon-flower
	326 Curtiss milkweed
	327 Sea lavender
	328 Hand fern
	329 Needle palm
	330 Yellow squirrel-banana
	331 Beach creeper
	332 Florida coontie
	333 Four-petal pawpaw
	334 Bird's nest spleenwort
	335 Burrowing four-o'clock
	336 Beach star
	337 Silver palm
	338 Dancing lady orchid
	339 Tamarindillo
	340 Fuch's bromeliad
	341 Everglades peperomia
	342 Buccaneer palm
	343 Slender spleenwort
	344 Pineland jacquemontia
	345 Mahogany mistletoe
	346 Florida thatch
	347 Twisted air plant
	348 Long's bittercress
	349 Venus's flytrap
	INVERTEBRATES (351-400)
	351 Monarch butterfly
	352 Zebra butterfly
	BIRDS (401-600)
	SHOREBIRDS (401-430)
	401 Shorebirds
	402 Terns
	403 Gulls
	404 Forster's tern
	405 Arctic tern
	406 Least tern (S)
	407 Roseate tern (S)
	408 Common tern
	409 Great black-backed gull
	410 Herring gull
	411 Laughing gull
	412 Black skimmer (S)
	413 Turnstones
	414 Plovers
	415 Piping plover
	416 American oystercatcher (S)
	WADING BIRDS (431-460)
	431 Wading birds
	432 Herons
	433 Egrets
	434 Rails
	435 Ibises
	436 Bitterns
	437 Great blue heron (S)
	438 Wood ibis (S)
	439 Anhinga
	440 Little blue heron (S)
	441 Yellow-crowned night heron (S)
	442 Black-crowned night heron
	443 Florida sandhill crane (S)
	444 Louisiana heron (S)
	445 Limpkin (S)
	446 Roseate spoonbill (S)
	447 Snowy egret (S)
	448 Magnificent frigate-bird (S)
	449 Reddish egret (S)
	450 Clapper rail
	451 King rail
	452 Virginia rail
	453 Sora rail
	WATERFOWL (461-500)
	461 Waterfowl
	462 Swans
	463 Geese
	464 Dabbling ducks
	465 Diving ducks
	466 Common eider
	467 Harlequin duck
	468 Wood duck
	469 Fulvous tree duck
	470 Loons

Newark
N. J.–N. Y.–PA.

1:250 000-scale map of
Atlantic Coast Ecological Inventory

NUS CORP.

** REFERENCE MATERIAL **
DO NOT FOLD, DRAW ON, MUTILATE IN ANY WAY. COPIES CAN BE MADE IN DRAFTING.
DATE: 6/22/89

Produced by
U. S. FISH AND WILDLIFE SERVICE
1980

AQUATIC ORGANISMS

Shown in BLUE; species with special status shown in RED(F) or (S) indicates species protected by Federal or State Legislation (see text)

SYMBOL	SPECIES
	PLANTS (1-50)
	1 Irish moss
	2 Rockweed
	INVERTEBRATES (51-100)
	51 Crabs
	52 Mussels
	53 Oysters
	54 Scallops
	55 Clams
	56 Worms
	57 Shrimp
	58 American lobster
	59 Blue crab
	60 Eastern oyster
	61 European oyster
	62 Bay scallop
	63 Deep-sea scallop
	64 Calico scallop
	65 Surf clam
	66 Hard clam
	67 Soft shell clam

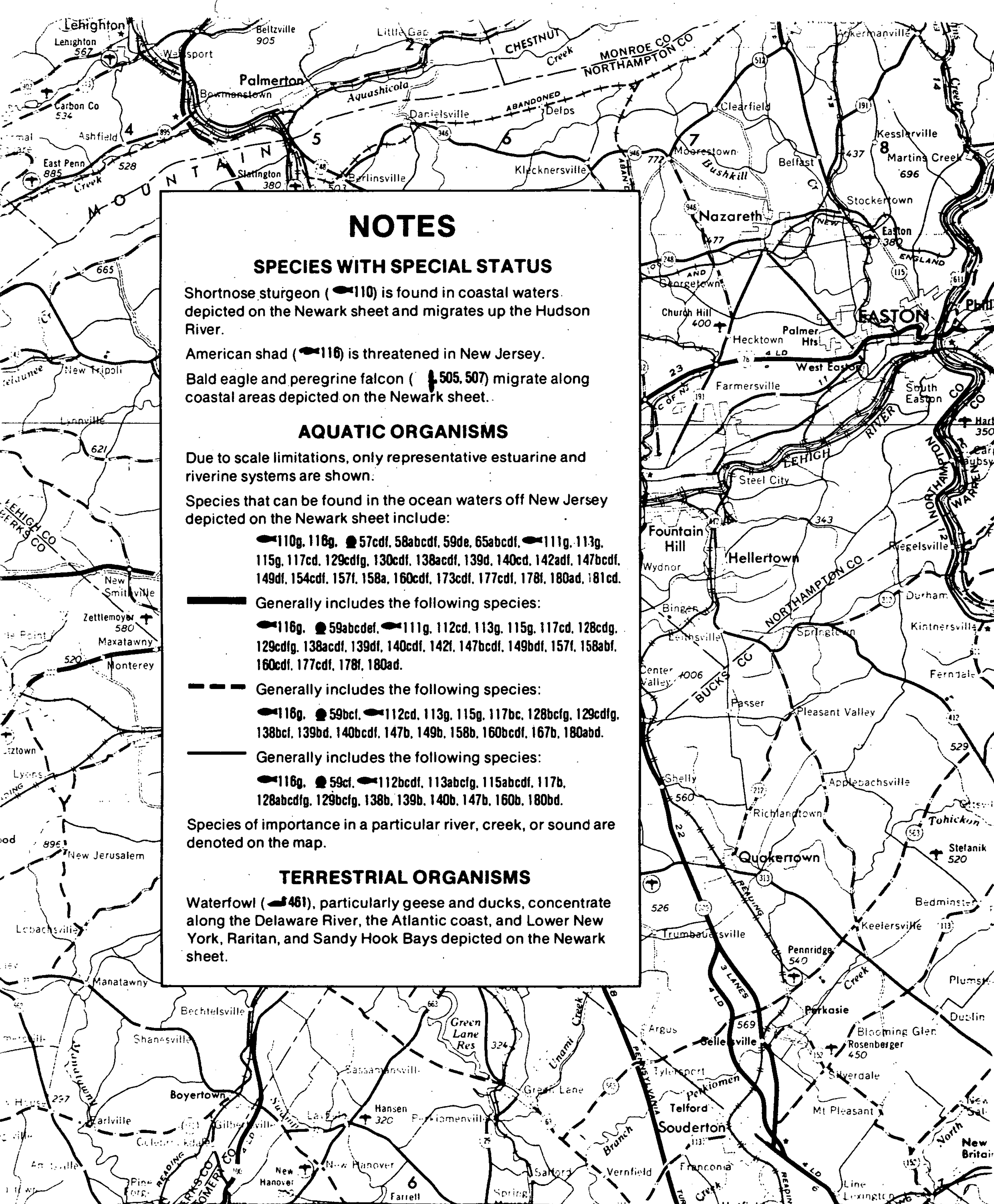
MAP & TRAVEL CENTER $15 4.95

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth Project file
DATE: 3/31/92
FROM: Claire Baumgis
COPIES: —
SUBJECT: Clarification of species' status as referenced in Atlantic Coast
~~REFERENCE~~: Ecological Inventory.

The Atlantic Coast Ecological Inventory (Newark map) lists the American shad as threatened in New Jersey; this reference is dated 1980. A more recent reference issued by the NJ Dept. of Environmental Protection and Energy (last revision 1991) does not include the American shad. Because the more current reference indicates the species is not listed as state endangered or threatened, it's not included in scoring.



NOTES

SPECIES WITH SPECIAL STATUS

Shortnose sturgeon (110) is found in coastal waters depicted on the Newark sheet and migrates up the Hudson River.

American shad (116) is threatened in New Jersey.

Bald eagle and peregrine falcon (505, 507) migrate along coastal areas depicted on the Newark sheet.

AQUATIC ORGANISMS

Due to scale limitations, only representative estuarine and riverine systems are shown.

Species that can be found in the ocean waters off New Jersey depicted on the Newark sheet include:

110g, 116g, 57cdf, 58abcdf, 59de, 65abcdf, 111g, 113g, 115g, 117cd, 129cdfg, 130cdf, 138acdf, 139d, 140cd, 142adf, 147bcdf, 149df, 154cdf, 157f, 158a, 160cdf, 173cdf, 177cdf, 178f, 180ad, 181cd.

Generally includes the following species:

116g, 59abcdef, 111g, 112cd, 113g, 115g, 117cd, 128cdg, 129cdfg, 138acdf, 139df, 140cdf, 142f, 147bcdf, 149bdf, 157f, 158abf, 160cdf, 177cdf, 178f, 180ad.

Generally includes the following species:

116g, 59bcf, 112cd, 113g, 115g, 117bc, 128bcfg, 129cdfg, 138bcf, 139bd, 140bcdf, 147b, 149b, 158b, 160bcdf, 167b, 180abd.

Generally includes the following species:

116g, 59cf, 112bcdf, 113abcfg, 115abcdf, 117b, 128abcdfg, 129bcfg, 138b, 139b, 140b, 147b, 160b, 180bd.

Species of importance in a particular river, creek, or sound are denoted on the map.

TERRESTRIAL ORGANISMS

Waterfowl (461), particularly geese and ducks, concentrate along the Delaware River, the Atlantic coast, and Lower New York, Raritan, and Sandy Hook Bays depicted on the Newark sheet.

435 Ibises
436 Bitterns
437 Great blue heron (S)
438 Wood ibis (S)
439 Anhinga
440 Little blue heron (S)
441 Yellow-crowned night heron (S)
442 Black-crowned night heron
443 Florida sandhill crane (S)
444 Louisiana heron (S)
445 Limpkin (S)
446 Roseate spoonbill (S)
447 Snowy egret (S)
448 Magnificent frigate-bird (S)
449 Reddish egret (S)
450 Clapper rail
451 King rail
452 Virginia rail
453 Sora rail

WATERFOWL (461-500)

461 Waterfowl
462 Swans
463 Geese
464 Dabbling ducks
465 Diving ducks
466 Common eider
467 Harlequin duck
468 Wood duck
469 Fulvous tree duck
470 Loons
471 Grebes
472 Brant geese
473 Snow goose
474 Gadwall
475 Black duck

RAPTORS (501-530)

501 Raptors
502 Owls
503 Kites
504 Hawks
505 Bald eagle (F)
506 Osprey (S)
507 Peregrine falcon (F)
508 Copper's hawk (S)
509 Swallow-tailed kite
510 Marsh hawk (S)
511 Southeastern American kestrel (S)
512 Florida burrowing owl (S)

SEABIRDS (531-550)

531 Seabirds
532 Petrels, shearwaters, and albatroses
533 Pelican and allies
534 Alcids
535 Brown pelican (F)
536 Black guillemot
537 Leach's petrel
538 Razorbill
539 Common puffin
540 Double-crested cormorant
541 Gannet
542 Wilson's petrel
543 Northern phalarope
544 Audubon's shearwater
545 Greater shearwater
546 Shearwaters
547 Petrels
548 Jaegers
549 White pelican

SONGBIRDS AND OTHERS (551-600)

551 Songbirds and others
552 Red-cockaded woodpecker (F)
553 Chachalaca
554 Bachman's warbler (F)
555 Wild turkey
556 American woodcock
557 Pileated woodpecker
558 Swainson's warbler
559 Ruffed grouse
560 Bobwhite
561 Mourning dove
562 Warblers
563 Ring-necked pheasant
564 Bank swallow
565 Dusky seaside sparrow (F)
566 White-crowned pigeon (S)

REPTILES AND AMPHIBIANS (601-700)

601 Eastern narrow-mouthed toad (S)
602 Eastern indigo snake (F)
603 American alligator (F)
604 Northern diamondback terrapin
605 Amphibians
606 Greater siren
607 Bog turtle (S)
608 Gopher tortoise (S)
609 Eastern tiger salamander (S)
610 Northern fence lizard
611 Five-lined skink
612 Map turtle
613 Plymouth red-bellied turtle (F)
614 Eastern diamondback rattlesnake
615 Carolina gopher frog
616 Florida gopher frog (S)
617 Atlantic salt marsh watersnake (F)
618 American crocodile (F)
619 Florida Keys mole skink (S)
620 Florida black-headed snake (S)
621 Pine barrens tree frog (S)
622 Northern pine snake (S)
623 Corn snake (S)
624 Timber rattlesnake (S)

AQUATIC ORGANISMS

Shown in BLUE; species with special status shown in RED (F) or (S) indicates species protected by Federal or State Legislation (see text).

SYMBOL — SPECIES

PLANTS (1-50)

1 Irish moss
2 Rockweed

INVERTEBRATES (51-100)

51 Crabs
52 Mussels
53 Oysters
54 Scallops
55 Clams
56 Worms
57 Shrimp
58 American lobster
59 Blue crab
60 Eastern oyster
61 European oyster
62 Bay scallop
63 Deep-sea scallop
64 Calico scallop
65 Surf clam
66 Hard clam
67 Soft shell clam
68 Brackish-water clam
69 Bloodworm
70 Sandworm
71 White shrimp
72 Brown shrimp
73 Northern shrimp
74 Rock crab
75 Jonah crab
76 Whelk
77 Ocean quahog
78 Pink shrimp
79 Stone crab
80 Spiny lobster

FISH (101-200)

101 Sharks, skates, rays
102 Herring
103 Salmon and trout
104 Catfish
105 Cod
106 Sunfish and bass
107 Drum
108 Flatfish
109 Longnose gar
110 Shortnose sturgeon (F)
111 Atlantic sturgeon (S)
112 American eel
113 Blueback herring
114 Hickory shad
115 Alewife
116 American shad (S)
117 Atlantic menhaden
118 Atlantic herring
119 Gizzard shad
120 Tarpon
121 Atlantic salmon
122 White catfish
123 Channel catfish
124 Yellow bullhead
125 Brown bullhead
126 Flat bullhead
127 Sea catfish
128 White perch
129 Striped bass
130 Black sea bass
131 Redbreast sunfish
132 Warmouth
133 Bluegill
134 Largemouth bass
135 Black crappie
136 Sheepshead
137 Spotted seatrout
138 Weakfish
139 Spot
140 Atlantic croaker
141 Southern kingfish
142 Northern kingfish
143 Gulf kingfish
144 Red drum
145 Star drum
146 Black drum
147 Summer flounder
148 Southern flounder
149 Winter flounder
150 Rainbow smelt
151 Atlantic tomcod
152 Threadfin shad
153 Carp
154 Atlantic mackerel
155 Chain pickerel
156 White bass
157 Northern puffer
158 Silver perch
159 Florida pompano
160 Bluefish
161 Spanish mackerel
162 Cobia
163 Mullet
164 White crappie
165 Redear sunfish
166 Smallmouth bass
167 Yellow perch
168 Pumpkinseed

543 Northern phalarope
544 Audubon's shearwater
545 Greater shearwater
546 Shearwaters
547 Petrels
548 Jaegers
549 White pelican

SONGBIRDS AND OTHERS (551–600)

551 Songbirds and others
552 Red-cockaded woodpecker (F)
553 Chachalaca
554 Bachman's warbler (F)
555 Wild turkey
556 American woodcock
557 Pileated woodpecker
558 Swainson's warbler
559 Ruffed grouse
560 Bobwhite
561 Mourning dove
562 Warblers
563 Ring-necked pheasant
564 Bank swallow
565 Dusky seaside sparrow (F)
566 White-crowned pigeon (S)

REPTILES AND AMPHIBIANS (601–700)

601 Eastern narrow-mouthed toad (S)
602 Eastern indigo snake (F)
603 American alligator (F)
604 Northern diamondback terrapin
605 Amphibians
606 Greater siren
607 Bog turtle (S)
608 Gopher tortoise (S)
609 Eastern tiger salamander (S)
610. Northern fence lizard
611 Five-lined skink
612 Map turtle
613 Plymouth red-bellied turtle (F)
614 Eastern diamondback rattlesnake
615 Carolina gopher frog
616 Florida gopher frog (S)
617 Atlantic salt marsh watersnake (F)
618 American crocodile (F)
619 Florida Keys mole skink (S)
620 Florida black-headed snake (S)
621 Pine barrens tree frog (S)
622 Northern pine snake (S)
623 Corn snake (S)
624 Timber rattlesnake (S)
625 Southern gray tree frog (S)

MAMMALS (701–800)

701 Beaver
702 Whitetail deer
703 European fallow deer
704 Blackbeard Island deer
705 Opossum
706 Marsh rabbit
707 Rice rat
708 Raccoon
709 St. Simon Island raccoon
710 Mink
711 River otter (F)
712 Feral hog
713 Feral cow
714 Cumberland Island pocket gopher
715 Anastasia Island cotton mouse
716 Aquatic furbearers
717 Black bear (S)
718 Bobcat
719 Eastern gray squirrel
720 Eastern fox squirrel
721 Eastern cottontail
722 Delmarva fox squirrel (F)
723 Muskrat
724 Red fox
725 Bats
726 Gray fox
727 Striped skunk
728 Nutria
729 Longtail weasel
730 Colonial pocket gopher (S)
731 Wild ponies
732 Sika deer
733 Beach meadow vole
734 Block Island meadow vole
735 Pallid beach mouse (S)
736 Sherman's fox squirrel (S)
737 Florida mouse (S)
738 Florida panther (F)
739 Goff's pocket gopher (S)
740 Key Largo wood rat (S)
741 Lower keys cotton rat (S)
742 Key Largo cotton mouse (S)

118 [illegible]
119 Gizzard shad
120 Tarpon
121 Atlantic salmon
122 White catfish
123 Channel catfish
124 Yellow bullhead
125 Brown bullhead
126 Flat bullhead
127 Sea catfish
128 White perch
129 Striped bass
130 Black sea bass
131 Redbreast sunfish
132 Warmouth
133 Bluegill
134 Largemouth bass
135 Black crappie
136 Sheepshead
137 Spotted seatrout
138 Weakfish
139 Spot
140 Atlantic croaker
141 Southern kingfish
142 Northern kingfish
143 Gulf kingfish
144 Red drum
145 Star drum
146 Black drum
147 Summer flounder
148 Southern flounder
149 Winter flounder
150 Rainbow smelt
151 Atlantic tomcod
152 Threadfin shad
153 Carp
154 Atlantic mackerel
155 Chain pickerel
156 White bass
157 Northern puffer
158 Silver perch
159 Florida pompano
160 Bluefish
161 Spanish mackerel
162 Cobia
163 Mullet
164 White crappie
165 Redear sunfish
166 Smallmouth bass
167 Yellow perch
168 Pumpkinseed
169 Atlantic halibut
170 Atlantic cod
171 Pollock
172 Haddock
173 Hake
174 Bluefin tuna
175 Walleye
176 Northern pike
177 Scup
178 Tautog
179 Atlantic spadefish
180 Bay anchovy
181 Butterfish
182 Little tunny
183 Atlantic bonito
184 Brown trout
185 Cunner
186 Yellowtail flounder
187 Gulf flounder
188 Pinfish
189 King mackerel
190 Pigfish
191 White grunt
192 Tripletail
193 Ladyfish
194 Snook
195 Jack
196 Snapper
197 Grouper
198 Sailfish
199 Great barracuda
200 Maryland darter (F)

REPTILES AND AMPHIBIANS (201–250)

201 Green sea turtle (F)
202 Loggerhead sea turtle (F)
203 Hawksbill turtle (F)
204 Atlantic ridley turtle (F)
205 Leatherback turtle (F)

MAMMALS (251–300)

251 Florida manatee (F)
252 Atlantic bottlenose dolphin
253 Pigmy sperm whale
254 Short-finned pilot whale
255 Harbor seal
256 Gray seal
257 Right whale (F)
258 Atlantic spotted dolphin

HABITAT USE

Shown in RED for species with special status, BLUE for aquatic organisms and BROWN for terrestrial organisms

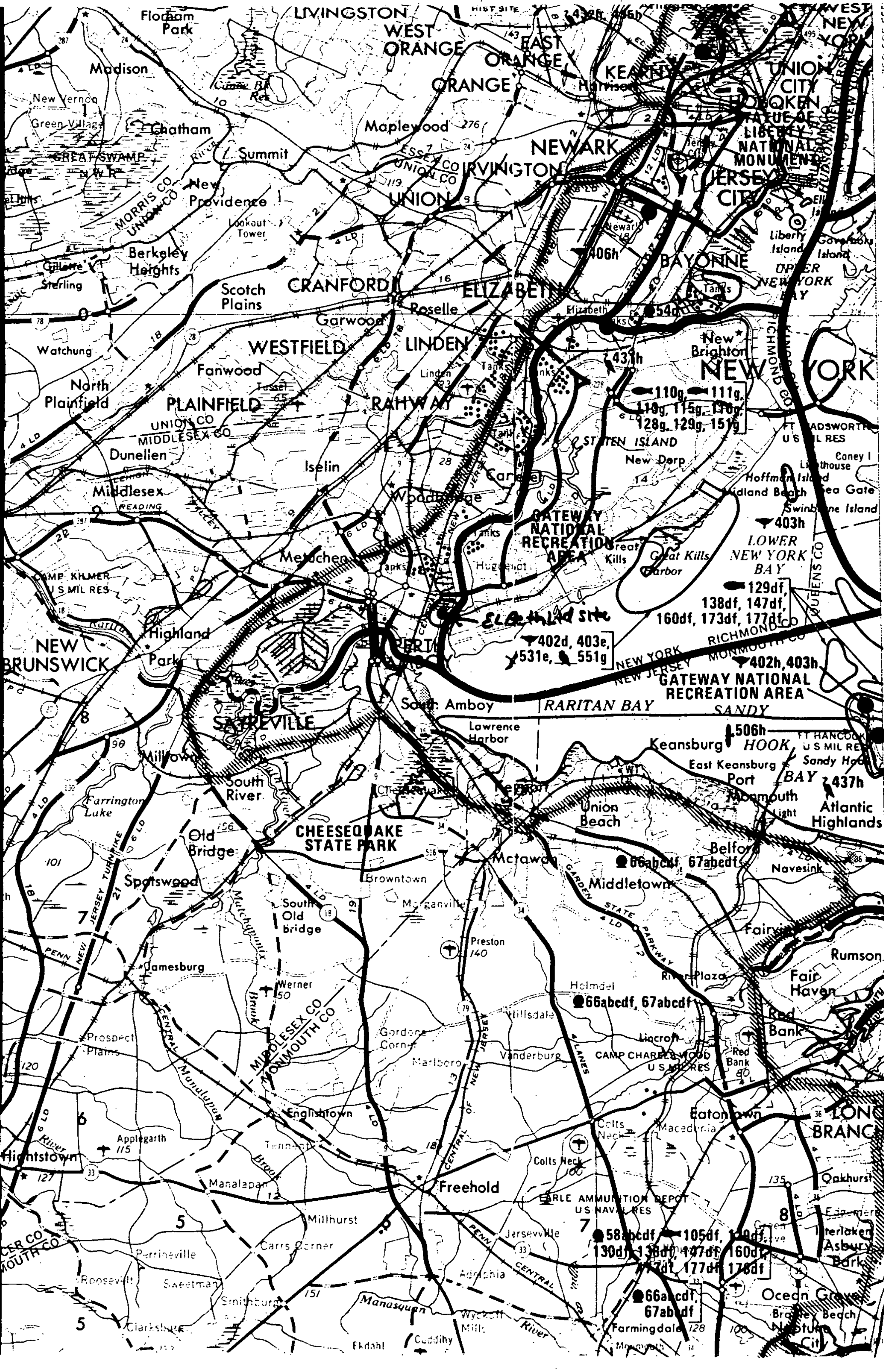
a Spawning ground
b Nursery
c Commercial harvesting area
d Adult concentration
e Overwintering area
f Sport fishing/hunting area
g Migratory area
h Nesting area
i Unusual distribution or specimen

High salinity estuarine habitat (generally 16.5 to 30 parts per thousand); arrows used for wide estuaries.

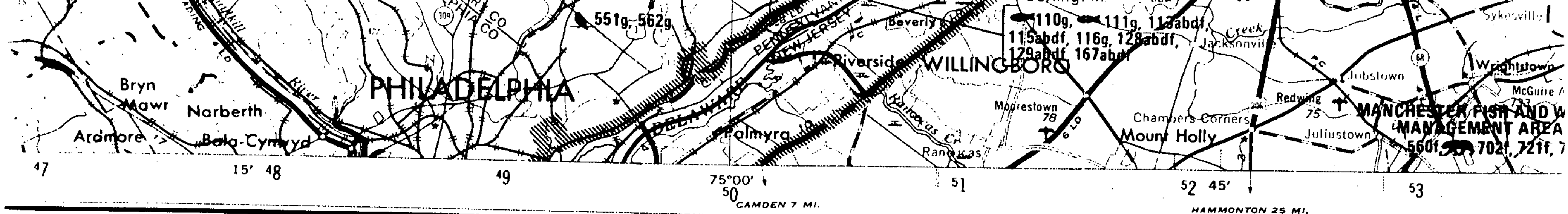
Mid salinity estuarine habitat (generally 5 to 16.5 parts per thousand).

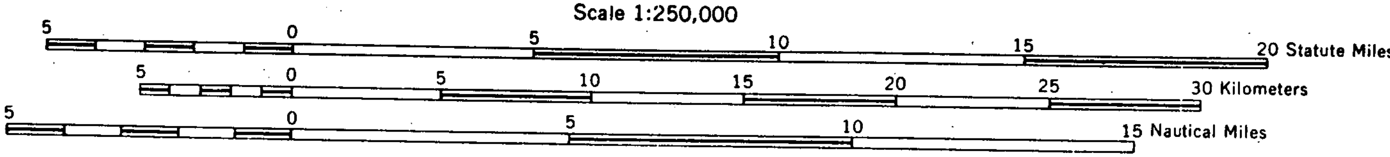
Low salinity estuarine habitat (generally 0.5 to 5 parts per thousand) and tidal freshwater

Non-tidal freshwater riverine and creek habitat.



LIVINGSTON
WEST ORANGE
EAST ORANGE
ORANGE
KEARNY
UNION CITY
HOBOKEN
STATUE OF LIBERTY NATIONAL MONUMENT
NEWARK
IRVINGTON
JERSEY CITY
Florham Park
Madison
New Vernon
Green Village
Chatham
GREAT SWAMP N W R
Summit
Maplewood
ESSEX CO
UNION CO
MORRIS CO
New Providence
UNION
Lookout Tower
Berkeley Heights
Gillette
Sterling
Scotch Plains
CRANFORD
ELIZABETH
BAYONNE
Liberty Island
Governors Island
UPPER NEW YORK BAY
406h
Roselle
Garwood
WESTFIELD
LINDEN
Watchung
Fanwood
North Plainfield
PLAINFIELD
RAHWAY
54d
431h
New Brighton
NEW YORK
RICHMOND CO
110g, 111g, 119g, 115g, 136g, 128g, 129g, 151g
STATEN ISLAND
FT WADSWORTH U S MIL RES
UNION CO
MIDDLESEX CO
Dunellen
Iselin
New Dorp
Coney I
Lighthouse
Hoffman Island
Midland Beach
Sea Gate
Swinburne Island
Middlesex
Woodbridge
Carteret
GATEWAY NATIONAL RECREATION AREA
403h
LOWER NEW YORK BAY
Great Kills
Great Kills Harbor
Metuchen
Huguenot
129df, 138df, 147df, 160df, 173df, 177df
QUEENS CO
CAMP KILMER U S MIL RES
Highland Park
ELC thiad site
402d, 403e, 531e, 551g
NEW BRUNSWICK
PERTH AMBOY
NEW YORK
NEW JERSEY
RICHMOND CO
MONMOUTH CO
402h, 403h
GATEWAY NATIONAL RECREATION AREA
SAYREVILLE
South Amboy
RARITAN BAY
SANDY HOOK BAY
Lawrence Harbor
506h
Keansburg
FT HANCOCK U S MIL RES
Sandy Hook
Milltown
East Keansburg
Port Monmouth
437h
South River
Farrington Lake
Union Beach
Atlantic Highlands
Old Bridge
CHEESEQUAKE STATE PARK
Keyport
Belford
Matawan
66abcdf, 67abcdf
Navesink
Spotswood
Browntown
Middletown
NEW JERSEY TURNPIKE
South Old Bridge
Morganville
GARDEN STATE PARKWAY
Fair Haven
Rumson
Preston
Jamesburg
Matchaponix Brook
Werner
Holmdel
River Plaza
66abcdf, 67abcdf
MIDDLESEX CO
MONMOUTH CO
Hillsdale
Red Bank
Prospect Plains
Gordons Corner
Lincroft
Marlboro
Vanderburg
CAMP CHARLES WOOD U S MIL RES
Englishtown
Eatontown
LONG BRANCH
Applegarth
Colts Neck
Hightstown
Tennent
Freehold
Oakhurst
Manalapan
EARLE AMMUNITION DEPOT U S NAVAL RES
Millhurst
Jerseyville
58abcdf, 105df, 130df, 138df, 147df, 160df, 177df, 176df
Asbury Park
Perrineville
Carrs Corner
Adelphia
Roosevelt
Sweetman
Smithburg
Manasquan River
66abcdf, 67abcdf
Ocean Grove
Bradley Beach
Clarksburg
Wyckoff Mills
Farmingdale
Ekdahl
Cuddihy

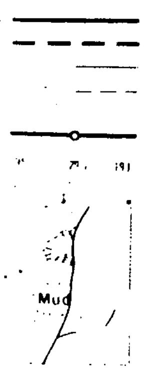




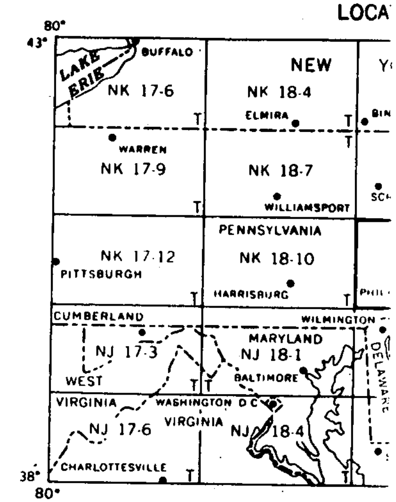
TRANSVERSE MERCATOR PROJECTION

BLACK NUMBERED LINES INDICATE THE 10,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 18

FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092, OR DENVER, COLORADO 80225



LOCA



T – Topographic map
T/B – Topographic/Bathymetric map
B – Bathymetric map
E – Ecological inventory map
E* – Includes portion of Albany

REFERENCE NO. 25

J004-0047C

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J004	November 18, 1991	1615

DISTRIBUTION:

Front Street Works file, J004

BETWEEN:	OF:	PHONE:
Mr. Robert Soldwedel	NJ Department of Environmental Protection and Energy - Fisheries Div.	(609) 292-1599

AND:

Claire Barufis (NUS)

DISCUSSION:

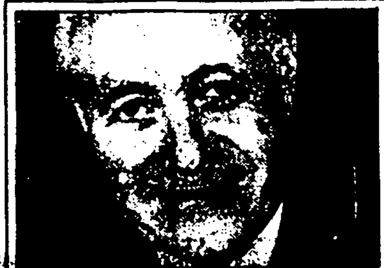
Mr. Soldwedel said that there is a statewide advisory on reducing consumer risk from fish contaminated with toxic chemicals such as PCBs, dioxin, or chlordane. At the Newark Bay complex, there is a prohibition on the sale and consumption of all fish from the tidal Passaic River, and a prohibition on the sale or consumption of striped bass, blue claw crabs, and american eels, from the entire Newark Bay complex, which includes Newark Bay, Passaic River up to Dundee Dam, the Arthur Kill and the Kill van Kull, and also, the Hackensack River up to Oradell Dam.

ACTION ITEMS:

REFERENCE NO. 26

The RECORD

State circulates warnings on consuming certain fish



DON ECKER

OUTDOORS

New Jersey state officials have issued some advisories and prohibitions regarding certain species of fish that may contain toxic chemicals and suggest methods of preparation to reduce exposure to contamination.

For the purposes of these alerts, the term "limited consumption" means not more than one meal per week of such fish, and persons of high risk — such as pregnant women, nursing mothers, women of child-bearing age, and young children — should not eat any such fish taken from designated regions. "Very limited consumption" restricts consumption to no more than one meal per month.

All sales of striped bass are prohibited. Limited consumption of all American eels is advised, especially in the Northeast region.

Otherwise, by region:

Newark Bay Complex (Newark Bay, Passaic River up to Dundee Dam, Hackensack River up to Oradell Dam, Arthur Kill, and Kill Van Kull and all tributaries) — sale or consumption of all fish from the tidal Passaic River, sale or consumption of striped bass and blue crabs, and sale of American eels from the entire complex are prohibited.

New Jersey waters of the Hudson River (up to the New Jersey-New York border, approximately four miles north of Alpine, and Upper New York Bay) — very limited consumption of striped bass, and limited consumption of white perch, white catfish, and bluefish is advised. The sale of American eels from these waters is prohibited.

Though the Lower New York Bay is not part of New Jersey waters, anglers fishing the lower bay, the upper part of New York Bay, and the Hudson River in New York waters are advised to follow New York state guidelines, which are similar to New Jersey's.

Raritan Bay Complex (New Jersey portion of Sandy Hook and Raritan bays and the tidal portion of the Raritan River upstream of the Route 1 bridge and New Brunswick) — limited consumption of striped bass, large bluefish (greater than 6 pounds or 24 inches), white catfish, and white perch.

Coastal New Jersey, including offshore state waters — limited consumption of striped bass and large bluefish.

Camden Area (including Strawbridge Lake, North and South branches of Pennsauken Creek, Cooper River and drainage, Cooper River Lake, Stewart Lake, Newton Lake) — sale and consumption of all fish prohibited.

Delaware River (between Interstate 276 bridge and tributary Birch Creek, Logan Township, Gloucester County) — Advisory against consumption of channel catfish. Sale of this species is prohibited.

The following steps are strongly recommended to reduce exposure to contamination in fish: Remove belly-flaps, backstrap, and lateral-line tissue before cooking. Broil on a raised rack, boil in water, remove skin before cooking or canning. Discard all oils and fat, and liquids that contain them. Avoid coatings that hold oils and fats.

Blue crabs: Remove and discard hepatopancreas (tomalley, green gland, mustard) before cooking.

For more detailed information, write Bruce Ruppel, CN 409, Trenton, N.J. 08652.

* * *

The New Jersey Sportfishing Expo will be at the Morristown Armory, Western Avenue, Morristown, Feb. 15 and 16. Displays will include the newest fishing boats, accessories, and tackle. Seminar speakers include Al Ristori on salt water, Joe Humphreys on trout, Capt. Mike DiPalma on fishing Lake Ontario, and J.B. Kasper on fishing for Delaware River shad and bass.

There will be pro teams from Berkley/Trilene, Yankee Baits, and Zebco/Quantum to answer questions about bass fishing and tackle, and seminars for trout and bass beginners. Times are 9 a.m. to 8 p.m. Saturday and 10 a.m. to 6 p.m. Sunday. Admission is $6. Children under 10 are admitted free. Door prizes will be awarded throughout the day. Phone (908) 876-5357 for more details.

REFERENCE NO. 27

NUS CORPORATION
SUPERFUND DIVISION

PROJECT NOTES

TO: EL Beth Ltd file

DATE: March 27, 1992

FROM: Claire Barrujio

COPIES: —

SUBJECT: Lot and block number, and property acreage, EL Beth site, Perth Amboy, New Jersey.

~~REFERENCE:~~ cs

Reference: noted below

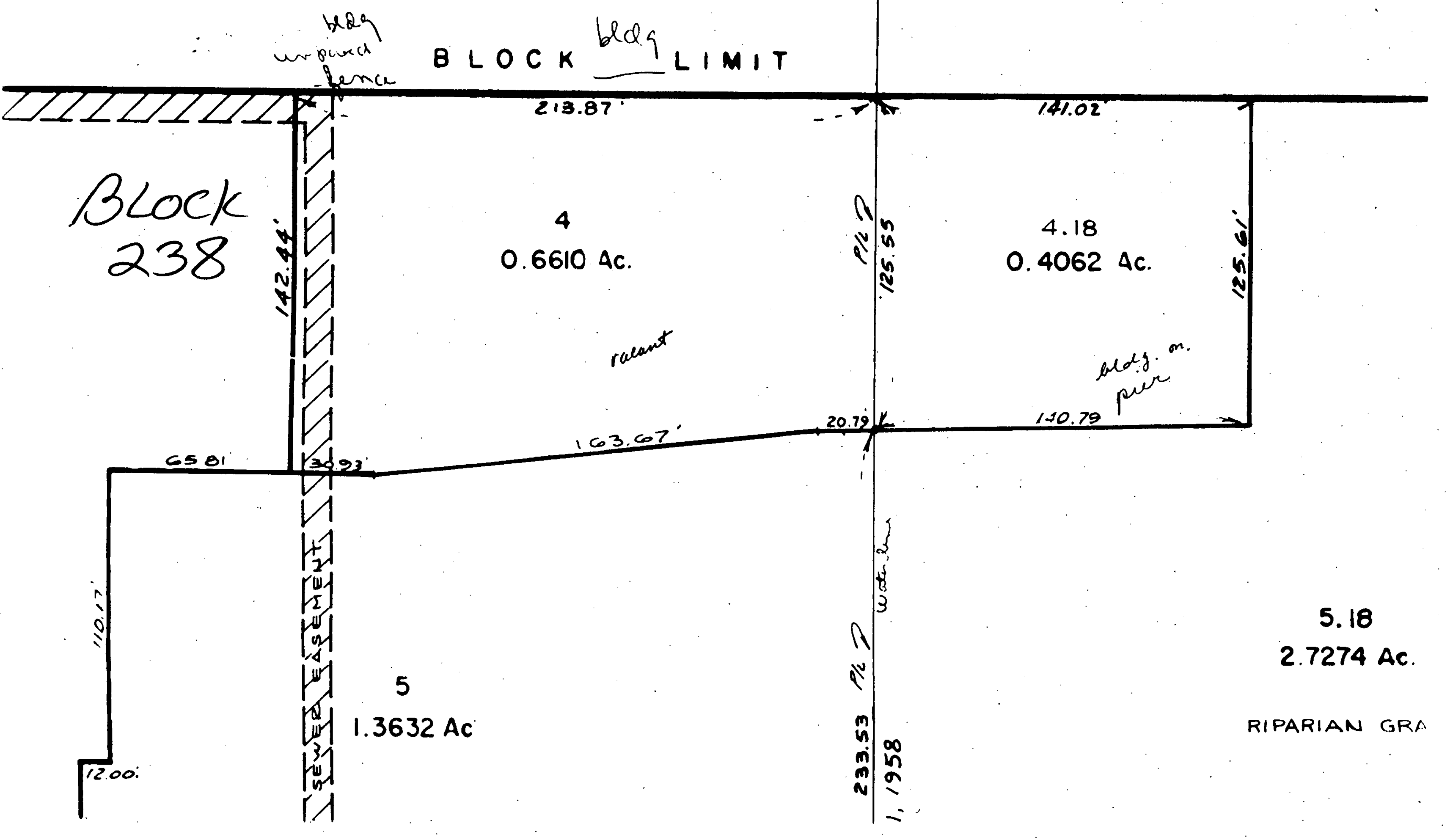
Per discussion with the Perth Amboy tax assessor's office, the property formerly E.L. Beth Ltd (now in the names of Jack and Robert Silverman) occupies lot Nos. 4 and 4.18 of Block 238 in Perth Amboy. As the clerk recalls, EL Beth used "500 High Street" as a mailing address, although another property is listed in the tax book as 500 High Street. (During the Halliburton NUS on-site reconnaissance on March 4, 1992 this was clarified; the EL Beth site, set back off of the road, is reached through the gate entrance at 500 High Street).

The tax map (Block 238) gives acreage values of 0.6610 acre for Lot 4, and 0.4062 acre for Lot 4.18.

NUS 443A 58 1182

SHEET № 44

Scale: 1" = 50'



REFERENCE NO. 28

NUS CORPORATION AND SUBSIDIARIES — **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 24, 1992	1320

DISTRIBUTION:

EL Beth file

BETWEEN:	OF:	PHONE:
Tom Haborak, Sr.	Perth Amboy Fire Department (Director)	(908) 826-1111

AND: Claire Baruzzis (NUS)

DISCUSSION:

I explained to Mr. Haborak that I was calling to inquire about the May, 1981 fire at E.L. Beth property and also about the July 1980 fire at Duane Marine property, in Perth Amboy. Mr. Haborak referred to his files as we spoke:

I asked about the cause of the May 1981 fire at EL Beth property; he said the fire at EL Beth occurred on Monday, May 18, 1981, and is recorded as a 'Structure fire'. Regarding the cause of the fire, he said "Ignition factor, combustibles too close to heat". I asked if any hazardous materials of concern were present - he said his file does not indicate any wastes; he said there are no special notes of any hazardous materials or quantities of materials. In regard to the cause of the fire, he said "kilns overheated and set pilings on fire". He said the fire was confined to 500 High Street; the fire did not extend to the General Cable Complex. I asked about the pier at EL Beth property; Mr. Haborak said it

ACTION ITEMS:

is not a pier, but rather, it is a building on pilings over the water; it had a concrete slab floor, and the wood pilings beneath were set on fire, he said.

Mr. Haborak read the EL Beth file sheet to me:

May 18, 1981, Monday. Time of alarm 2:56 PM and fire was out on May 20 at 1125 PM. EL Beth 500 High Street. Alarm by telephone. Structure fire, had 4 engines and

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 24, 1992	1320

DISTRIBUTION:

EL Beth file

Page 2 of 3

BETWEEN:	OF:	PHONE:
Tom Haborak, Sr.	Perth Amboy Fire Department (Director)	(908) 826-1111

AND: Claire Barnofsis (NUS)

DISCUSSION: (Continued)

one truck there; got mutual aid. About 100 firefighters.
Area of origin: crawl space. Level of fire origin: below ground.
Termination stage: flame (when broke out)
Equipment involved in ignition: Kilns
Form of heat ignition: Overheated Kilns
Type of material ignited: wood pilings
Ignition factor: Combustibles too close to heat.

I asked Mr. Haborak if there are any statements in the file concerning amount of waste present, and he said "no".

I asked about the 1980 "Duane Marine" fire. Mr. Haborak said he calls it the General Cable fire. He referred to the file and said: July 7, 1980, fire started at General Cable, at 42 Washington Street (which is at the corner of Washington and Rector Streets), and it spread to Duane Marine. He said it spread to the entire block. I asked if EL Beth was

ACTION ITEMS:

possibly affected; he said it could have been, since they're all in the same area. He said the building at High and Buckingham Streets is General Cable - the building extended to the water; EL Beth is situated between Duane Marine and General Cable. He said the fire ran from Front Street, up Washington Street to High Street and halfway down High Street to the corner

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 24, 1992	1320

DISTRIBUTION:

El Beth file

Page 3 of 3

BETWEEN:	OF:	PHONE:
Tom Haborak, Sr.	Perth Amboy Fire Department (Director)	(908) 826-1111

AND: Claire Barufo (NUS)

DISCUSSION: (continued)

of High and Buckingham - the fire did not get into the building at High and Buckingham - it stopped there. The fire had started in the middle of the block and went west, east and north. He said that nothing is stated about chemicals at El Beth property in the 1980 fire report. He said the General Cable (Duane Marine) fire was a week-long fire, lasting from Monday to Saturday. I asked if there is any file reference to chemicals present during the 1980 fire, and he said nothing is stated.

Mr. Haborak said that the Middlesex County Prosecutor's Office, former arson task force, investigated the 1980 and 1981 fires, and that they might have information as well.

ACTION ITEMS:

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	March 25, 1992	1250

DISTRIBUTION:

EL Beth file

BETWEEN:	OF:	PHONE:
Investigator Ritz	Middlesex County Prosecutor's Office	(908)745-3300

AND: Claire Barnufo (NUS)

DISCUSSION:

Mr. Ritz returned my call. First, he said that according to his information, the EL Beth property is a church. (I then told him it was a foundry). He said that his reports are strictly just origin and cause reports, and that he wouldn't have hazardous materials information. He is referring to computer information as we speak, because the physical file is archived, he said. He said that the EL Beth fire is listed as an accidental fire. He read to me: "High and Washington Street, May 18, 1981, victim listed as EL Beth".

I also asked him about the July 1980 fire on the same block. He said that he doesn't know offhand if it entered the EL Beth property. He said it burned from High Street all the way to the river. I noted to him, however that reportedly, the fire didn't extend to the very northernmost part of the block, so maybe it did not enter the EL Beth property; also, since the pier

ACTION ITEMS:

~~or~~ was in use in 1981, it apparently wasn't affected by the 1980 fire - therefore, I did not ask him to check further on the extent of the 1980 fire.

NUS 067 REVISED 0685

REFERENCE NO. 29

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	February 24, 1992	~1355

DISTRIBUTION:

EL Beth file

BETWEEN:	OF:	PHONE:
Carol Surgens, Esq	Jones and Day	(212) 326-8355

AND: Claire Barufi (NUS)

DISCUSSION:

The address to which I can send letter to Mr. Robert Silverman and Mr. Jack Silverman regarding on-site reconnaissance is: 23 Audubon Court, Short Hills, New Jersey 07078.

Ms. Surgens and I discussed the site. She said it's right on the edge of Arthur Kill. The manufacturing plant was on a wooden pier that extended over the Kill. She said about one acre of the property is on land. She said the owner said that most of the property is concrete paved. A garage is present. The manufacturing facility is about 11,000 to 12,000 sq. feet. "They applied for and received Part A RCRA permit as a storage facility in the late 1970's, about 1979" she said. "They bought the operating company that was present at the location. In 1979 to 1980 they stored certain hazardous wastes on site for more than 90 days, and so acquired a Part A RCRA permit." She said the waste was listed as

ACTION ITEMS:

acid waste; it was ammonium chloride in solid form - she said it was molten when skimmed, and it solidified in drums. She said a solder manufacturing operated there. She said metals were molten in vats for recovery. Ammonium chloride was skimmed off of the surface and was stored in 55 gallon drums, on the land portion of the property, on a concrete slab. Part of the storage area

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	February 24, 1992	~1355

DISTRIBUTION:

EL Beth file

BETWEEN:	OF:	PHONE:
Carol Surgens, Esq	Jones and Day	(212) 326-8355

AND: Claire Baurfio (NUS)

DISCUSSION: (continued)

was in a garage, with a concrete floor. She said materials were stored 90 days or less. She said that after 1980, the site no longer stored ammonium chloride, because they no longer used the ammonium chloride process - it was just used in 1979 and 1980. She said that regarding other wastes, they'll explain further. May have had lube oil, classed as hazardous in New Jersey but not by federal law. May have been drums of baghouse dust. No underground tanks are present at the site. To the extent of her client's knowledge, there are now no drums present. She said that they "ceased operations and moved, and then in 1981 the fire occurred and the facility burned down". She said that what's left are: concrete land surface, part of a pier, ruins of the building on pier. She said, regarding the pier and ruins, it is totally at our own risk to walk

~~**ACTION ITEMS:**~~

there, as it's very, very unsafe. I told her we will not walk there. I asked if the pier is fenced off, and she said she's not sure. She said some fencing is present, but that she's not sure how much. She said the area is subject to vandalism. I asked if formerly there were underground tanks; she said she's not sure but the owners can discuss it further. (continued)

NUS CORPORATION AND SUBSIDIARIES **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
J030	February 24, 1992	~1355

DISTRIBUTION:

El Beth file

page 3 of 3

BETWEEN:	OF:	PHONE:
Carol Surgens, Esq	Jones and Day	(212) 326-8355

AND: Claire Barnpio (NUS)

DISCUSSION: (continued)

She said that one of the baghouses might still be present. She believes that only a residue of dust may remain, and possibly some scrap metal. Drums were removed.

Regarding planned HNUS on-site reconnaissance, she said they prefer that decon water from recon be drummed and removed, rather than disposed of on site; they're concerned about environmental (legal) complications. But, she said, the site is mostly paved.

She said the site is adjacent to Duane Marine site, and N.J. DEP has been to Duane Marine, investigating; Duane Marine was a very large industrial operation, and had a fire.

Regarding El Beth property, utilities had been in pipes, buried in the ground, and in some places, where utilities were removed, it is dug up, and looks like trenching.

We established that the on-site reconnaissance at the

~~ACTION ITEMS:~~

El Beth property in Perth Amboy will be on March 4th, at 9:30 AM, and that we'll meet at the property entrance. She will inquire if the property owners have any documents to provide.

REFERENCE NO. 30

toxicity (rat) of less than 50 milligrams per kilogram, an inhalation LC 50 toxicity (rat) of less than 2 milligrams per liter, or a dermal LD 50 toxicity (rabbit) of less than 200 milligrams per kilogram or is otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible, illness. (Waste listed in accordance with these criteria will be designated Acute Hazardous Waste.)

(3) It contains any of the toxic constituents listed in Appendix VIII unless, after considering any of the following factors, the Administrator concludes that the waste is not capable of posing a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported or disposed of, or otherwise managed:

(i) The nature of the toxicity presented by the constituent.

(ii) The concentration of the constituent in the waste.

(iii) The potential of the constituent or any toxic degradation product of the constituent to migrate from the waste into the environment under the types of improper management considered in paragraph (a)(3)(vii) of this section.

(iv) The persistence of the constituent or any toxic degradation product of the constituent.

(v) The potential for the constituent or any toxic degradation product of the constituent to degrade into non-harmful constituents and the rate of degradation.

(vi) The degree to which the constituent or any degradation product of the constituent bioaccumulates in ecosystems.

(vii) The plausible types of improper management to which the waste could be subjected.

(viii) The quantities of the waste generated at individual generation sites or on a regional or national basis.

(ix) The nature and severity of the human health and environmental damage that has occurred as a result of the improper management of wastes containing the constituent.

(x) Action taken by other governmental agencies or regulatory programs based on the health or environmental hazard posed by the waste or waste constituent.

(xi) Such other factors as may be appropriate.

Substances will be listed on Appendix VIII only if they have been shown in scientific studies to have toxic, carcinogenic, mutagenic or teratogenic effects on humans or other life forms.

(Wastes listed in accordance with these criteria will be designated Toxic wastes.)

(b) The Administrator may list classes or types of solid waste as hazardous waste if he has reason to believe that individual wastes, within the class or type of waste, typically or frequently are hazardous under the definition of hazardous waste found in section 1004(5) of the Act.

(c) The Administrator will use the criteria for listing specified in this section to establish the exclusion limits referred to in § 261.5(c).

Subpart C—Characteristics of Hazardous Waste

§ 261.20 General.

(a) A solid waste, as defined in § 261.2, which is not excluded from regulation as a hazardous waste under § 261.4(b), is a hazardous waste if it exhibits any of the characteristics identified in this subpart.

[*Comment*: § 262.11 of this chapter sets forth the generator's responsibility to determine whether his waste exhibits one or more of the characteristics identified in this subpart]

(b) A hazardous waste which is identified by a characteristic in this subpart, but is not listed as a hazardous waste in Subpart D, is assigned the EPA Hazardous Waste Number set forth in the respective characteristic in this subpart. This number must be used in complying with the notification requirements of section 3010 of the Act and certain recordkeeping and reporting requirements under Parts 262 through 265, 268, and Part 270 of this chapter.

(c) For purposes of this subpart, the Administrator will consider a sample obtained using any of the applicable sampling methods specified in Appendix I to be a representative sample within the meaning of Part 260 of this chapter.

[*Comment*: Since the Appendix I sampling methods are not being formally adopted by the Administrator, a person who desires to employ an alternative sampling method is not required to demonstrate the equivalency of his method under the procedures set forth in §§ 260.20 and 260.21.]

[45 FR 33119, May 19, 1980, as amended at 48 FR 14294, Apr. 1, 1983; 51 FR 40636, Nov. 7, 1986]

§ 261.21 Characteristic of ignitability.

(a) A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

(1) It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in ASTM Standard D-93-79 or D-93-80 (incorporated by reference, see § 260.11), or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78 (incorporated by reference, see § 260.11), or as determined by an equivalent test method approved by the Administrator under procedures set forth in §§ 260.20 and 260.21.

(2) It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

(3) It is an ignitable compressed gas as defined in 49 CFR 173.300 and as determined by the test methods described in that regulation or equivalent test methods approved by the Administrator under §§ 260.20 and 260.21.

(4) It is an oxidizer as defined in 49 CFR 173.151.

(b) A solid waste that exhibits the characteristic of ignitability, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D001.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981]

§ 261.22 Characteristic of corrosivity.

(a) A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

(1) It is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5, as determined by a pH meter using either an EPA test method or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21. The EPA test method for pH is specified as Method 5.2 in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11).

(2) It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods" (incorporated by reference, see § 260.11) or an equivalent test method approved by the Administrator under the procedures set forth in §§ 260.20 and 260.21.

(b) A solid waste that exhibits the characteristic of corrosivity, but is not listed as a hazardous waste in Subpart D, has the EPA Hazardous Waste Number of D002.

[45 FR 33119, May 19, 1980, as amended at 46 FR 35247, July 7, 1981]

§ 261.23 Characteristic of reactivity.

(a) A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has *any* of the following properties:

(1) It is normally unstable and readily undergoes violent change without detonating.

(2) It reacts violently with water.

(3) It forms potentially explosive mixtures with water.

(4) When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.

(5) It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can gener-

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
F024	Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. [This listing does not include light ends, spent filters and filter aids, spent dessicants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in § 261.32.].	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.).	(H)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.	(T)

*(I,T) should be used to specify mixtures containing ignitable and toxic constituents.

[46 FR 4617, Jan. 16, 1981, as amended at 46 FR 27477, May 20, 1981; 49 FR 5312, Feb. 10, 1984; 49 FR 37070, Sept. 21, 1984; 50 FR 665, Jan. 4, 1985; 50 FR 2000, Jan. 14, 1985; 50 FR 53319, Dec. 31, 1985; 51 FR 2702, Jan. 21, 1986; 51 FR 6541, Feb. 25, 1986]

§ 261.32 Hazardous wastes from specific sources.

The following solid wastes are listed hazardous wastes from specific sources unless they are excluded under §§ 260.20 and 260.22 and listed in Appendix IX.

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
Wood preservation: K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
Inorganic pigments:		
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments.	(T)
K003	Wastewater treatment sludge from the production of molybdate orange pigments	(T)
K004	Wastewater treatment sludge from the production of zinc yellow pigments	(T)
K005	Wastewater treatment sludge from the production of chrome green pigments	(T)
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).	(T)
K007	Wastewater treatment sludge from the production of iron blue pigments	(T)
K008	Oven residue from the production of chrome oxide green pigments	(T)
Organic chemicals:		
K009	Distillation bottoms from the production of acetaldehyde from ethylene	(T)
K010	Distillation side cuts from the production of acetaldehyde from ethylene	(T)
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile	(R, T)
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile	(R, T)
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile	(T)
K015	Still bottoms from the distillation of benzyl chloride	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
K016	Heavy ends or distillation residues from the production of carbon tetrachloride	(T)
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.	(T)
K018	Heavy ends from the fractionation column in ethyl chloride production	(T)
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	(T)
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	(T)
K021	Aqueous spent antimony catalyst waste from fluoromethanes production	(T)
K022	Distillation bottom tars from the production of phenol/acetone from cumene	(T)
K023	Distillation light ends from the production of phthalic anhydride from naphthalene	(T)
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene	(T)
K093	Distillation light ends from the production of phthalic anhydride from ortho-xylene	(T)
K094	Distillation bottoms from the production of phthalic anhydride from ortho-xylene	(T)
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene	(T)
K026	Stripping still tails from the production of methy ethyl pyridines	(T)
K027	Centrifuge and distillation residues from toluene diisocyanate production	(R, T)
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	(T)
K029	Waste from the product steam stripper in the production of 1,1,1-trichloroethane	(T)
K095	Distillation bottoms from the production of 1,1,1-trichloroethane	(T)
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	(T)
K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.	(T)
K083	Distillation bottoms from aniline production	(T)
K103	Process residues from aniline extraction from the production of aniline	(T)
K104	Combined wastewater streams generated from nitrobenzene/aniline production	(T)
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes	(T)
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	(T)
K111	Product washwaters from the production of dinitrotoluene via nitration of toluene	(C,T)
K112	Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	(T)
K113	Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	(T)
K114	Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	(T)
K115	Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	(T)
K116	Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine.	(T)
K117	Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene.	(T)
K118	Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	(T)
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	(T)
Inorganic chemicals:		
K071	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.	(T)
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	(T)
K106	Wastewater treatment sludge from the mercury cell process in chlorine production	(T)
Pesticides:		
K031	By-product salts generated in the production of MSMA and cacodylic acid	(T)
K032	Wastewater treatment sludge from the production of chlordane	(T)
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	(T)
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	(T)
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	(T)
K035	Wastewater treatment sludges generated in the production of creosote	(T)
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton	(T)
K037	Wastewater treatment sludges from the production of disulfoton	(T)
K038	Wastewater from the washing and stripping of phorate production	(T)
K039	Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	(T)
K040	Wastewater treatment sludge from the production of phorate	(T)
K041	Wastewater treatment sludge from the production of toxaphene	(T)
K098	Untreated process wastewater from the production of toxaphene	(T)

Industry and EPA hazardous waste No.	Hazardous waste	Hazard code
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	(T)
K043	2,6-Dichlorophenol waste from the production of 2,4-D	(T)
K099	Untreated wastewater from the production of 2,4-D	(T)
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt.	(T)
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.	(C, T)
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	(T)
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.	(T)
Explosives:		
K044	Wastewater treatment sludges from the manufacturing and processing of explosives	(R)
K045	Spent carbon from the treatment of wastewater containing explosives	(R)
K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	(T)
K047	Pink/red water from TNT operations	(R)
Petroleum refining:		
K048	Dissolved air flotation (DAF) float from the petroleum refining industry	(T)
K049	Slop oil emulsion solids from the petroleum refining industry	(T)
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry	(T)
K051	API separator sludge from the petroleum refining industry	(T)
K052	Tank bottoms (leaded) from the petroleum refining industry	(T)
Iron and steel:		
K061	Emission control dust/sludge from the primary production of steel in electric furnaces.	(T)
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).	(C,T)
Secondary lead:		
K069	Emission control dust/sludge from secondary lead smelting	(T)
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	(T)
Veterinary pharmaceuticals:		
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	(T)
K101	Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	(T)
K102	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	(T)
Ink formulation: K086	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	(T)
Coking:		
K060	Ammonia still lime sludge from coking operations	(T)
K087	Decanter tank tar sludge from coking operations	(T)

[46 FR 4618, Jan. 16, 1981, as amended at 46 FR 27476-27477, May 20, 1981; 49 FR 37070, Sept. 21, 1984; 50 FR 42942, Oct. 23, 1985; 51 FR 5330, Feb. 13, 1986; 51 FR 19322, May 28, 1986; 51 FR 33612, Sept. 22, 1986; 51 FR 37729, Oct. 24, 1986; 52 FR 28698, Aug. 3, 1987]

§ 261.33 Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof.

The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded as described in § 261.2(a)(2)(i), when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, they are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

(a) Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section.

(b) Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section.

(c) Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraph (e) of this section, unless the container is empty as defined in § 261.7(b)(3) of the chapter.

[Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, EPA considers the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

(d) Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in paragraph (e) or (f) of this section, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill, into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in paragraph (e) or (f) of this section.

[*Comment:* The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in . . ." refers to a chemical substance which is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in paragraph (e) or (f). Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in paragraph (e) or (f), such waste will be listed in either § 261.31 or § 261.32 or will be identified as a hazardous waste by the characteristics set forth in Subpart C of this part.]

(e) The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in paragraphs (a) through (d) of this section, are identified as acute hazardous wastes (H) and are subject to be the small quantity exclusion defined in § 261.5(e).

[*Comment:* For the convenience of the regulated community the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound only is listed for acute toxicity.]

These wastes and their corresponding EPA Hazardous Waste Numbers are:

Hazardous waste No.	Chemical abstracts No.	Substance
P023	107-20-0	Acetaldehyde, chloro-
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P057	640-19-7	Acetamide, 2-fluoro-
P058	62-74-8	Acetic acid, fluoro-, sodium salt
P002	591-08-2	1-Acetyl-2-thiourea
P003	107-02-8	Acrolein
P070	116-06-3	Aldicarb
P004	309-00-2	Aldrin
P005	107-18-6	Allyl alcohol
P006	20859-73-8	Aluminum phosphide (R,T)
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P008	504-24-5	4-Aminopyridine
P009	131-74-8	Ammonium picrate (R)

TABLE 3—SAMPLING AND ANALYSIS METHODS CONTAINED IN SW-846—Continued

Title	First edition		Second edition	
	Section No.	Method No.	Section No.	Method No.
Sample Analysis Request Sheet	2.0-9		1.3.5	
Sample Delivery to Laboratory	2.0-10		1.3.6	
Shipping of Samples	2.0-10		1.3.7	
Receipt and Logging of Sample	2.0-12		1.3.8	
Assignment of Sample for Analysis	2.0-13		1.3.9	
Sampling Methodology	3.0		1.4	
Containers	3.2-2		1.4.1	
Tanks	3.2-2		1.4.2	
Waste Piles	3.2-2		1.4.3	
Landfills and Lagoons	3.2-2		1.4.4	
Waste Evaluation Procedures			2.0	
Characteristics of Hazardous Waste			2.1	
Ignitability	4.0		2.1.1	
Pensky-Martens Closed-Cup Method	4.1		2.1.1	1010
Setaflash Closed-Cup Method	4.1		2.1.1	1020
Corrosivity	5.0		2.1.2	
Corrosivity Toward Steel	5.3		2.1.2	1110
Reactivity	6.0		2.1.3	
Extraction Procedure Toxicity	7.0		2.1.4	
Extraction Procedure Toxicity Test	7.1, 7.2, 7.5			
Method and Structural Integrity Test	7.4		2.1.4	1310
Sample Workup Techniques			4.0	
Inorganic Techniques	8.49		4.1	
Acid Digestion for Flame AAS	[1]		4.1	3010
Acid Digestion for Furnace AAS	[1]		4.1	3020
Acid Digestion of Oil, Grease, or Wax	8.49-9		4.1	3030
Dissolution Procedure for Oil, Grease or Wax	8.49-8			
Alkaline Digestion	8.0	8.458	4.1	3060
Organic Techniques	8.0		4.2	
Separatory Funnel Liquid-Liquid Extraction	9.0	9.1	4.2	3510
Continuous Liquid-Liquid Extraction	9.0	9.01	4.2	3520
Acid-Base Cleanup Extraction	8.0	8.84	4.2	3530
Soxhlet Extraction	8.0	8.86	4.2	3540
Sonication Extraction	8.0	8.85	4.2	3550
Sample Introduction Techniques			5.0	
Headspace	8.0	8.82	5.0	5020
Purge-and-Trap	8.0	8.83	5.0	5030
Inorganic Analytical Methods	8.0		7.0	
Antimony, Flame AAS	8.0	8.50	7.0	7470
Antimony, Furnace AAS	8.0	8.50	7.0	7471
Arsenic, Flame AAS	8.0	8.51	7.0	7060
Arsenic, Furnace AAS	8.0	8.51	7.0	7061
Barium, Flame AAS	8.0	8.52	7.0	7080
Barium, Furnace AAS	8.0	8.52	7.0	7081
Cadmium, Flame AAS	8.0	8.53	7.0	7130
Cadmium, Furnace AAS	8.0	8.53	7.0	7131
Chromium, Flame AAS	8.0	8.54	7.0	7090
Chromium, Furnace AAS	8.0	8.54	7.0	7191
Chromium, Hexavalent, Coprecipitation	8.0	8.545	7.0	7195
Chromium, Hexavalent, Colorimetric	8.0	8.546	7.0	7196
Chromium, Hexavalent, Chelation	8.0	8.547	7.0	7197
Lead, Flame AAS	8.0	8.56	7.0	7420
Lead, Furnace AAS	8.0	8.56	7.0	7421
Mercury, Cold Vapor, Liquid	8.0	8.57	7.0	7470
Mercury, Cold Vapor, Solid	8.0	8.57	7.0	7471
Nickel, Flame AAS	8.0	8.58	7.0	7520
Nickel, Furnace AAS	8.0	8.58	7.0	7521
Selenium, Flame AAS	8.0	8.59	7.0	7740
Selenium, Gaseous Hydride AAS	8.0	8.59	7.0	7741
Silver, Flame AAS	8.0	8.60	7.0	7760
Silver, Furnace AAS	8.0	8.60	7.0	7761
Organic Analytical Methods	8.0		8.0	
Gas Chromatographic Methods	8.0		8.1	
Halogenated Volatile Organics	8.0	8.01	8.1	8010
Nonhalogenated Volatile Organics	8.0	8.01	8.1	8015
Aromatic Volatile Organics	8.0	8.02	8.1	8020
Acrolein, Acrylonitrile, Acetonitrile	8.0	8.03	8.1	8030
Phenols	8.0	8.04	8.1	8040

TABLE 3—SAMPLING AND ANALYSIS METHODS CONTAINED IN SW-846—Continued

Title	First edition		Second edition	
	Section No.	Method No.	Section No.	Method No.
Phthalate Esters	8.0	8.06	8.1	8060
Organochlorine Pesticides and PCBs	8.0	8.08	8.1	8080
Nitroaromatics and Cyclic Ketones	8.0	8.09	8.1	8090
Polynuclear Aromatic Hydrocarbons	8.0	8.10	8.1	8100
Chlorinated Hydrocarbons	8.0	8.12	8.1	8120
Organophosphorus Pesticides	8.0	8.22	8.1	8140
Chlorinated Herbicides	8.0	8.40	8.1	8150
Gas Chromatographic/Mass Spectroscopy Methods (GC/MS)	8.0		8.2	
GC/MS Volatiles	8.0	8.24	8.2	8240
GC/MS Semi-Volatiles, Packed Column	8.0	8.25	8.2	8250
GC/MS Semi-Volatiles, Capillary	8.0	8.27	8.2	8270
Analysis of Chlorinated Dioxins and Dibenzofurans			8.2	8280
High Performance Liquid Chromatographic Methods (HPLC)	8.0		8.3	
Polynuclear Aromatic Hydrocarbons	8.0	8.10	8.3	8310
Miscellaneous Analytical Methods	8.0		9.0	
Cyanide; Total and Amenable to Chlorination	8.0	8.55	9.0	9010
Total Organic Halogen (TOX)	8.0	8.56	9.0	9020
Sulfides	8.0	8.57	9.0	9030
pH Measurement	5.0	5.2	9.0	9040
Quality Control/Quality Assurance	10.0		10.1	
Introduction	10.0		10.1	
Program Design	10.0		10.2	
Sampling	10.0		10.3	
Analysis	10.0		10.4	
Data Handling	10.0		10.5	

[1] See specific metal.

[48 FR 15257, Apr. 8, 1983, as amended at 50 FR 2000, Jan. 14, 1985; 50 FR 42942, Oct. 23, 1985; 51 FR 5330, Feb. 13, 1986; 51 FR 6541, Feb. 25, 1986; 51 FR 37729, Oct. 24, 1986]

APPENDIX IV—[RESERVED FOR RADIOACTIVE WASTE TEST METHODS]

APPENDIX V—[RESERVED FOR INFECTIOUS WASTE TREATMENT SPECIFICATIONS]

APPENDIX VI—[RESERVED FOR ETIOLOGIC AGENTS]

APPENDIX VII—BASIS FOR LISTING HAZARDOUS WASTE

EPA hazardous waste No.	Hazardous constituents for which listed
F001	Tetrachloroethylene, methylene chloride trichloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chlorinated fluorocarbons.
F002	Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trichfluoroethane, ortho-dichlorobenzene, trichlorofluoromethane.
F003	N.A.
F004	Cresols and cresylic acid, nitrobenzene.
F005	Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, 2-ethoxyethanol, benzene, 2-nitropropane.
F006	Cadmium, hexavalent chromium, nickel, cyanide (complexed).
F007	Cyanide (salts).
F008	Cyanide (salts).
F009	Cyanide (salts).
F010	Cyanide (salts).
F011	Cyanide (salts).
F012	Cyanide (complexed).
F019	Hexavalent chromium, cyanide (complexed).
F020	Tetra- and pentachlorodibenzo-p-dioxins; tetra and pentachlorodi-benzofurans; tri- and tetrachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
F021	Penta- and hexachlorodibenzo-p-dioxins; penta- and hexachlorodibenzofurans; pentachlorophenol and its derivatives.
F022	Tetra-, penta-, and hexachlorodibenzo-p-dioxins; tetra-, penta-, and hexachlorodibenzofurans.
F023	Tetra-, and pentachlorodibenzo-p-dioxins; tetra- and pentachlorodibenzofurans; tri- and tetrachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.

EPA hazardous waste No.	Hazardous constituents for which listed
F024	Chloromethane, dichloromethane, trichloromethane, carbon tetrachloride, chloroethylene, 1,1-dichloroethane, 1,2-dichloroethane, trans-1-2-dichloroethylene, 1,1-dichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, 1,1,1,2-tetra-chloroethane, 1,1,2,2-tetrachloroethane, tetrachloroethylene, pentachloroethane, hexachloroethane, allyl chloride (3-chloropropene), dichloropropane, dichloropropene, 2-chloro-1,3-butadiene, hexachloro-1,3-butadiene, hexachlorocyclopentadiene, hexachlorocyclohexane, benzene, chlorbenzene, dichlorobenzenes, 1,2,4-trichlorobenzene, tetrachlorobenzene, pentachlorobenzene, hexachlorobenzene, toluene, naphthalene.
F026	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans.
F027	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans; tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
F028	Tetra-, penta-, and hexachlorodibenzo-*p*-dioxins; tetra-, penta-, and hexachlorodibenzofurans; tri-, tetra-, and pentachlorophenols and their chlorophenoxy derivative acids, esters, ethers, amine and other salts.
K001	Pentachlorophenol, phenol, 2-chlorophenol, p-chloro-m-cresol, 2,4-dimethylphenyl, 2,4-dinitrophenol, trichlorophenols, tetrachlorophenols, 2,4-dinitrophenol, creosote, chrysene, naphthalene, fluoranthene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benz(a)anthracene, dibenz(a)anthracene, acenaphthalene.
K002	Hexavalent chromium, lead
K003	Hexavalent chromium, lead.
K004	Hexavalent chromium.
K005	Hexavalent chromium, lead.
K006	Hexavalent chromium.
K007	Cyanide (complexed), hexavalent chromium.
K008	Hexavalent chromium.
K009	Chloroform, formaldehyde, methylene chloride, methyl chloride, paraldehyde, formic acid.
K010	Chloroform, formaldehyde, methylene chloride, methyl chloride, paraldehyde, formic acid, chloroacetaldehyde.
K011	Acrylonitrile, acetonitrile, hydrocyanic acid.
K013	Hydrocyanic acid, acrylonitrile, acetonitrile.
K014	Acetonitrile, acrylamide.
K015	Benzyl chloride, chlorobenzene, toluene, benzotrichloride.
K016	Hexachlorobenzene, hexachlorobutadiene, carbon tetrachloride, hexachloroethane, perchloroethylene.
K017	Epichlorohydrin, chloroethers [bis(chloromethyl) ether and bis (2-chloroethyl) ethers], trichloropropene, dichloropropanols.
K018	1,2-dichloroethane, trichloroethylene, hexachlorobutadiene, hexachlorobenzene.
K019	Ethylene dichloride, 1,1,1-trichloroethane, 1,1,2-trichloroethane, tetrachloroethanes (1,1,2,2-tetrachloroethane and 1,1,1,2-tetrachloroethane), trichloroethylene, tetrachloroethylene, carbon tetrachloride, chloroform, vinyl chloride, vinylidene chloride.
K020	Ethylene dichloride, 1,1,1-trichloroethane, 1,1,2-trichloroethane, tetrachloroethanes (1,1,2,2-tetrachloroethane and 1,1,1,2-tetrachloroethane), trichloroethylene, tetrachloroethylene, carbon tetrachloride, chloroform, vinyl chloride, vinylidene chloride.
K021	Antimony, carbon tetrachloride, chloroform.
K022	Phenol, tars (polycyclic aromatic hydrocarbons).
K023	Phthalic anhydride, maleic anhydride.
K024	Phthalic anhydride, 1,4-naphthoquinone.
K025	Meta-dinitrobenzene, 2,4-dinitrotoluene.
K026	Paraldehyde, pyridines, 2-picoline.
K027	Toluene diisocyanate, toluene-2, 4-diamine.
K028	1,1,1-trichloroethane, vinyl chloride.
K029	1,2-dichloroethane, 1,1,1-trichloroethane, vinyl chloride, vinylidene chloride, chloroform.
K030	Hexachlorobenzene, hexachlorobutadiene, hexachloroethane, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane, ethylene dichloride.
K031	Arsenic.
K032	Hexachlorocyclopentadiene.
K033	Hexachlorocyclopentadiene.
K034	Hexachlorocyclopentadiene.
K035	Creosote, chrysene, naphthalene, fluoranthene benzo(b) fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd) pyrene, benzo(a)anthracene, dibenzo(a)anthracene, acenaphthalene.
K036	Toluene, phosphorodithioic and phosphorothioic acid esters.
K037	Toluene, phosphorodithioic and phosphorothioic acid esters.
K038	Phorate, formaldehyde, phosphorodithioic and phosphorothioic acid esters.
K039	Phosphorodithioic and phosphorothioic acid esters.
K040	Phorate, formaldehyde, phosphorodithioic and phosphorothioic acid esters.
K041	Toxaphene.
K042	Hexachlorobenzene, ortho-dichlorobenzene.
K043	2,4-dichlorophenol, 2,6-dichlorophenol, 2,4,6-trichlorophenol.
K044	N.A.
K045	N.A.
K046	Lead.
K047	N.A.
K048	Hexavalent chromium, lead.
K049	Hexavalent chromium, lead.
K050	Hexavalent chromium.
K051	Hexavalent chromium, lead.
K052	Lead.
K060	Cyanide, napthalene, phenolic compounds, arsenic.
K061	Hexavalent chromium, lead, cadmium.
K062	Hexavalent chromium, lead.
K069	Hexavalent chromium, lead, cadmium.
K071	Mercury.
K073	Chloroform, carbon tetrachloride, hexacholroethane, trichloroethane, tetrachloroethylene, dichloroethylene, 1,1,2,2-tetrachloroethane.
K083	Aniline, diphenylamine, nitrobenzene, phenylenediamine.
K084	Arsenic.
K085	Benzene, dichlorobenzenes, trichlorobenzenes, tetrachlorobenzenes, pentachlorobenzene, hexachlorobenzene, benzyl chloride.
K086	Lead, hexavalent chromium.
K087	Phenol, naphthalene.
K093	Phthalic anhydride, maleic anhydride.
K094	Phthalic anhydride.

EPA hazardous waste No.	Hazardous constituents for which listed
K095	1,1,2-trichloroethane, 1,1,1,2-tetrachloroethane, 1,1,2,2-tetrachloroethane.
K096	1,2-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane.
K097	Chlordane, heptachlor.
K098	Toxaphene.
K099	2,4-dichlorophenol, 2,4,6-trichlorophenol.
K100	Hexavalent chromium, lead, cadmium.
K101	Arsenic.
K102	Arsenic.
K103	Aniline, nitrobenzene, phenylenediamine.
K104	Aniline, benzene, diphenylamine, nitrobenzene, phenylenediamine.
K105	Benzene, monochlorobenzene, dichlorobenzenes, 2,4,6-trichlorophenol.
K106	Mercury.
K111	2,4-Dinitrotoluene.
K112	2,4-Toluenediamine, *o*-toluidine, *p*-toluidine, aniline.
K113	2,4-Toluenediamine, *o*-toluidine, *p*-toluidine, aniline.
K114	2,4-Toluenediamine, *o*-toluidine, *p*-toluidine.
K115	2,4-Toluenediamine.
K116	Carbon tetrachloride, tetrachloroethylene, chloroform, phosgene.
K117	Ethylene dibromide.
K118	Ethylene dibromide.
K123	Ethylene thiourea.
K124	Ethylene thiourea.
K125	Ethylene thiourea.
K126	Ethylene thiourea.
K136	Ethylene dibromide.

N.A.—Waste is hazardous because it fails the test for the characteristic of ignitability, corrosivity, or reactivity.

[46 FR 4619, Jan. 16, 1981, as amended at 46 FR 27477, May 20, 1981; 49 FR 5312, Feb. 10, 1984; 50 FR 2000, Jan. 14, 1985; 50 FR 42942, Oct. 23, 1985; 51 FR 5330, Feb. 13, 1986; 51 FR 6541, Feb. 25, 1986; 51 FR 37729, Oct. 24, 1986]

APPENDIX VIII—HAZARDOUS CONSTITUENTS

Common name	Chemical abstracts name	Chemical abstracts No.	Hazardous waste No.
Acetonitrile	Same	75-05-8	U003
Acetophenone	Ethanone, 1-phenyl-	98-86-2	U004
2-Acetylaminefluarone	Acetamide, N-9H-fluoren-2-yl-	53-96-3	U005
Acetyl chloride	Same	75-36-5	U006
1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	591-08-2	P002
Acrolein	2-Propenal	107-02-8	P003
Acrylamide	2-Propenamide	79-06-1	U007
Acrylonitrile	2-Propenenitrile	107-13-1	U009
Aflatoxins	Same	1402-68-2	
Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.	116-06-3	P070
Aldrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-,(1alpha, 4alpha,4abeta,5alpha,8alpha,8abeta)-.	309-00-2	P004
Allyl alcohol	2-Propen-1-ol	107-18-6	P005
Aluminum phosphide	Same	20859-73-8	P006
4-Aminobiphenyl	[1,1'-Biphenyl]-4-amine	92-67-1	
5-(Aminomethyl)-3-isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	2763-96-4	P007
4-Aminopyridine	4-Pyridinamine	504-24-5	P008
Amitrole	1H-1,2,4-Triazol-3-amine	61-82-5	U011
Ammonium vanadate	Vanadic acid, ammonium salt	7803-55-6	P119
Aniline	Benzenamine	62-53-3	U012
Antimony	Same	7440-36-0	
Antimony compounds, N.O.S.[1]			
Aramite	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester.	140-57-8	
Arsenic	Same	7440-38-2	
Arsenic compounds, N.O.S.[1]			
Arsenic acid	Arsenic acid H_3AsO_4	7778-39-4	P010
Arsenic pentoxide	Arsenic oxide As_2O_5	1303-28-2	P011
Arsenic trioxide	Arsenic oxide As_2O_3	1327-53-3	P012
Auramine	Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl.	492-80-8	U014
Azaserine	L-Serine, diazoacetate (ester)	115-02-6	U015

REFERENCE NO. 31

GSC-TR8645

GRAPHICAL EXPOSURE MODELING SYSTEM

(GEMS)

USER'S GUIDE

VOLUME 2. MODELING

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES AND TOXIC SUBSTANCES
EXPOSURE EVALUATION DIVISION
Task No. 3-2
Contract No. 68Ø2397Ø
Project Officer: Russell Kinerson
Task Manager: Loren Hall

Prepared by:

GENERAL SCIENCES CORPORATION
84Ø1 Corporate Drive
Landover, Maryland 2Ø785

Submitted: December 1, 1986

E.L. BETH LTD.

LATITUDE 40:30:46 LONGITUDE 74:15:34 1980 POPULATION

Mile⇒	0-0.25	0.25-0.5	0.5-1.0	1.0-2.0	2.0-3.0	3.0-4.0	
KM	0.00- 0.4	0.4- 0.8	0.8- 1.6	1.6- 3.2	3.2- 4.8	4.8- 6.4	SECTOR TOTALS
S 1	279	4567	19400	19821	25530	43847	113444
RING TOTALS	279	4567	19400	19821	25530	43847	113444

REFERENCE NO. 32

EVENTS: ALL

EPA ID NO.	SITE NAME / STREET / CITY / COUNTY CODE AND NAME	STATE ZIP / CONG DIST.	OPRBLE UNIT	EVENT TYPE	EVENT QUAL	ACTUAL START DATE	ACTUAL COMPL DATE	CURRENT EVENT LEAD
NJD067484923	E L FETH LTD		00	DS1			11/01/91	EPA (FUND)
	500 HIGH STREET							
	PERTH AMBOY	NJ 08861						
	023 MIDDLESEX	NJ-06						
NJD980505077	E. RUTHERFORD JOINT SEWAGE T. P.		00	DS1			05/31/85	STATE(FUND)
	FOOT OF BOROUGH AVENUE			PA1	LOWER PRIORITY	08/22/90	09/24/90	STATE(FUND)
	EAST RUTHERFORD	NJ 07073		SI1	LOWER PRIORITY	02/05/87	03/31/87	STATE(FUND)
	003 BERGEN	NJ-09						
NJD980771604	E.I. DUPONT DE NEMOURS		00	DS1			05/01/85	STATE(FUND)
	CANNONBALL RD			PA1	LOWER PRIORITY	05/01/85	06/01/85	STATE(FUND)
	POMPTON LAKES	NJ 07442		SI1	HIGHER PRIORITY	06/30/89	09/27/89	EPA (FUND)
	031 PASSAIC	NJ-08						
NJD000820159	E.I. DUPONT DE NEMOURS		00	DS1			06/01/81	EPA (FUND)
	WASHINGTON RD			PA1	LOWER PRIORITY	07/29/87	08/21/87	STATE(FUND)
	SAYREVILLE	NJ 08859		SI1	HIGHER PRIORITY	06/30/89	09/27/89	EPA (FUND)
	023 MIDDLESEX	NJ-15						
NJD002185965	E.I. DUPONT DE NEMOURS		00	DS1			06/01/81	EPA (FUND)
	SOUTH WOOD AVENUE			PA1	LOWER PRIORITY		09/01/84	STATE(FUND)
	LINDEN	NJ 07036		SI1	NO FURTHER REMDL ACT PLND	08/15/85	09/13/85	EPA (FUND)
	039 UNION	NJ-15						
NJD002385490	E.I. DUPONT DE NEMOURS		00	DS1			04/01/79	OTHER
	P.O. BOX 152 (DUPONT ROAD)			PA1	NO FURTHER REMDL ACT PLND		09/01/84	STATE(FUND)
	CARNEYS POINT	NJ 08069		PA2	NO FURTHER REMDL ACT PLND		03/08/89	STATE(FUND)
	033 SALEM	NJ-02		SI1	HIGHER PRIORITY	10/01/90	12/17/90	EPA (FUND)
NJD002385730	E.I. DUPONT DE NEMOURS		00	DS1			12/01/79	EPA (FUND)
	CHAMBERS WORKS /RTE 130			PA1	LOWER PRIORITY		03/01/80	EPA (FUND)
	DEEPWATER	NJ 08023		SI1	DEFERRED TO RCRA OR NRC	12/01/79	05/01/80	EPA (FUND)
	033 SALEM	NJ-02						
NJD002444024	E.I. DUPONT DE NEMOURS		00	DS1			06/01/81	EPA (FUND)
	CHEESEQUAKE RD			PA1	LOWER PRIORITY	07/29/87	08/06/87	STATE(FUND)
	SAYREVILLE	NJ 08859		SI1	HIGHER PRIORITY	11/01/89	12/31/89	EPA (FUND)
	023 MIDDLESEX	NJ-15						

EVENTS: ALL

EPA ID NO.	SITE NAME / STREET / CITY / COUNTY CODE AND NAME	STATE ZIP / CONG DIST.	OPRBLE UNIT	EVENT TYPE	EVENT QUAL	ACTUAL START DATE	ACTUAL COMPL DATE	CURRENT EVENT LEAD
NJD980654131	DOVER MUNICIPAL WELL 4							
(CONTINUED)			(00)	SI2	HIGHER PRIORITY	07/01/80	08/01/82	STATE(FUND)
			01	CO1		03/01/87		STATE ONLY
NJD980771570	DOVER TOWNSHIP LANDFILL		00	DS1			04/10/84	STATE(FUND)
	BAY & CHURCH STREETS			PA1	LOWER PRIORITY		09/01/84	STATE(FUND)
	DOVER TWP	NJ 08753		SI1	HIGHER PRIORITY	10/01/84	11/01/84	STATE(FUND)
	029 OCEAN	NJ-02						
NJD085698686	DOWELL SCHLUMBERGER INCORPORATED		00	DS1			04/10/84	STATE(FUND)
	MAPLE & JONES BLVD.			PA1	LOWER PRIORITY	05/01/85	06/01/85	STATE(FUND)
	MOUNT HOLLY	NJ 08060		SI1	NO FURTHER REMDL ACT PLND	09/22/87	09/22/87	EPA (FUND)
	005 BURLINGTON	NJ-06						
NJD053518536	DREW CHEM CORP		00	DS1			11/01/91	EPA (FUND)
	1106 HARRISON AVE							
	KEARNY	NJ 07032						
	017 HUDSON	NJ-11						
NJD001217496	DREW CHEMICAL CORPORATION/PVO		00	DS1			04/10/84	STATE(FUND)
	1 DREW CHEMICAL PLAZA			PA1	LOWER PRIORITY	05/01/85	05/31/85	STATE(FUND)
	BOONTON	NJ 07005		SI1	NO FURTHER REMDL ACT PLND	10/01/90	12/31/90	STATE(FUND)
	027 MORRIS	NJ-13						
NJD081995508	DREW METALEX CORPORATION		00	DS1			06/06/89	EPA (FUND)
	WATERWORTS ROAD			PA1	DEFERRED TO RCRA OR NRC		09/27/89	EPA (FUND)
	OLD BRIDGE	NJ 08857						
	023 MIDDLESEX	NJ-03						
NJD054526553	DUANE MARINE		00	RV1	STABILIZATION	07/03/84	04/28/87	RESP. PARTY
	26 WASHINGTON ST			IR2		07/03/84	04/28/87	EPA (FUND)
	PERTH AMBOY	NJ 08861		RV3	STABILIZATION	11/29/84	12/16/84	EPA (FUND)
	023 MIDDLESEX	NJ-15		DS1			05/01/79	EPA (FUND)
				PA1	HIGHER PRIORITY	05/04/87	05/11/87	EPA (FUND)
				SI1	DEFERRED TO RCRA OR NRC	06/30/89	09/29/89	STATE(FUND)
				OH1			09/28/84	EPA (FUND)
NJD081898819	DUBOIS CHEMICALS		00	DS1			01/01/80	EPA (FUND)
	UNION AVE & DUBOIS			PA1	LOWER PRIORITY		02/01/80	EPA (FUND)
	EAST RUTHERFORD	NJ 07073		SI1	NO FURTHER REMDL ACT PLND	12/01/79	02/01/80	EPA (FUND)
	003 BERGEN	NJ-09						

CERCLIS DATA BASE TIME: 16:51:49 U.S. EPA SUPERFUND PROGRAM VERSION 2.00
LEVEL: REGION 02 ** C E R C L I S ** RUN DATE: 03/02/92
SELECTION: INTEGRATED LIST-4: SITE ALIAS LOCATION LISTING RUN TIME: 13:43:03

SEQUENCE: REG, ST, SITE NAME
REGION: 02

EPA ID	SITE/ALIAS NAME / STREET / CITY / COUNTY NAME	STATE / COUNTY	ZIP CODE	ALIAS SEQ. #	NAME SOURCE	FED FAC	CONG DIST.
NJD002355774 (CONTINUED)	DYNASIL CORP OF AMERICA			01			
	CAMDEN	NJ					
NJD067484923	E L BETH LTD					N	NJ-06
	500 HIGH STREET						
	PERTH AMBOY	NJ	08861				
	MIDDLESEX	023					
NJD980505077	E. RUTHERFORD JOINT SEWAGE T. P.				EPA	N	NJ-09
	FOOT OF BOROUGH AVENUE						
	EAST RUTHERFORD	NJ	07073				
	BERGEN	003					
	EAST RUTHERFORD PLANT			01			
NJD980771604	E.I. DUPONT DE NEMOURS				EPA	N	NJ-08
	CANNONBALL RD						
	POMPTON LAKES	NJ	07442				
	PASSAIC	031					
NJD000820159	E.I. DUPONT DE NEMOURS				EPA	N	NJ-15
	WASHINGTON RD						
	SAYREVILLE	NJ	08859				
	MIDDLESEX	023					
	DUPONT			01			
	F & F PLANT BURNING GROUND			03			
	PARLIN F & F			04			

CERCLIS DATA BASE TIME: 16:51:49
LEVEL: REGION 02
SELECTION: INTEGRATED

U.S. EPA SUPERFUND PROGRAM
** C E R C L I S **
LIST-4: SITE ALIAS LOCATION LISTING

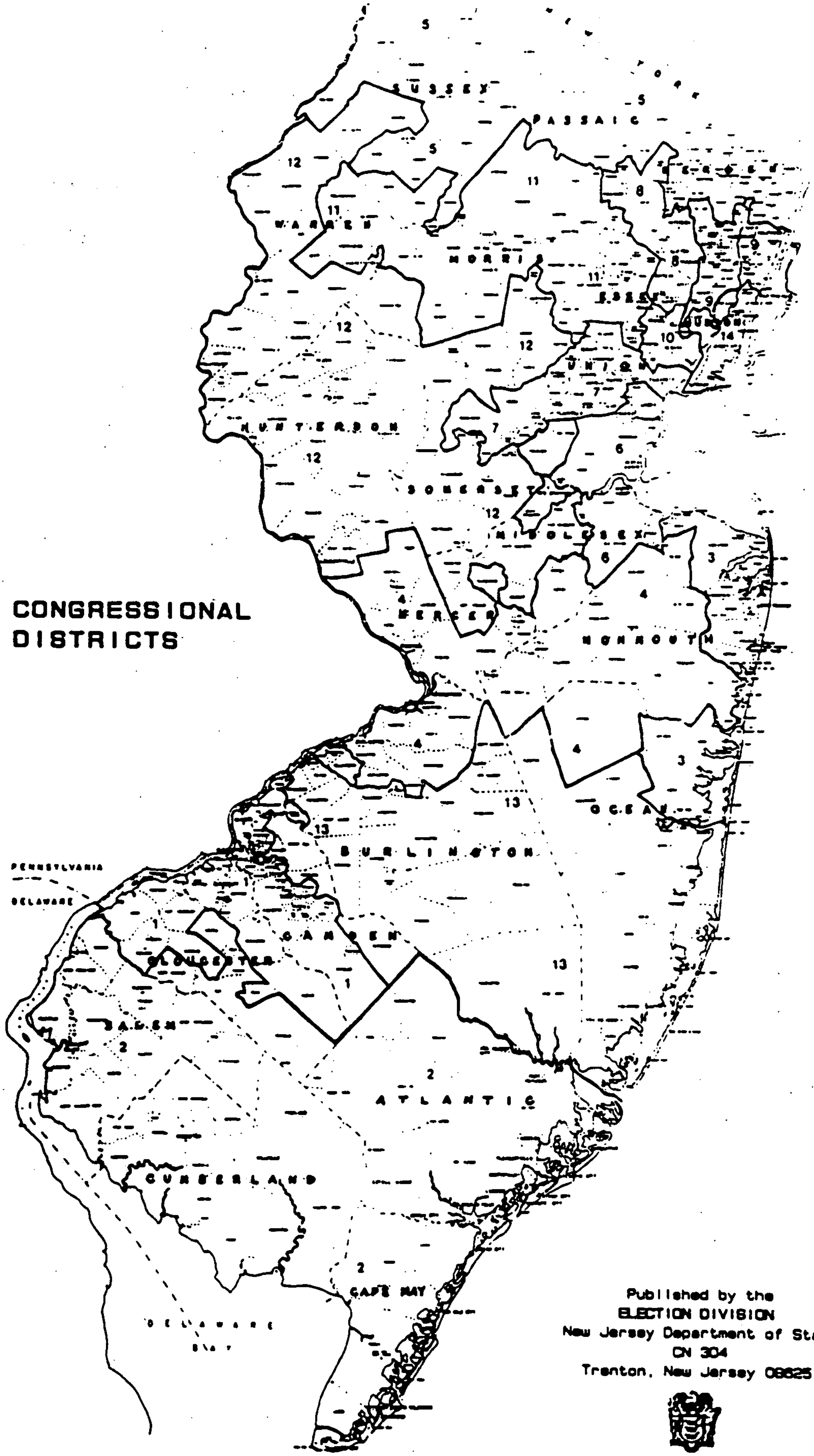
VERSION 2.00
RUN DATE: 03/02/92
RUN TIME: 13:43:03

SEQUENCE: REG, ST, SITE NAME
REGION: 02

EPA ID	SITE/ALIAS NAME STREET CITY COUNTY NAME	STATE COUNTY	ZIP CODE	ALIAS SEQ. #	NAME SOURCE	FED FAC	CONG DIST.
NJD054525553	DUANE MARINE 26 WASHINGTON ST PERTH AMBOY MIDDLESEX	NJ 023	08861		STS	N	NJ-15
	DUANE MARINE			01			
	MIDDLESEX	NJ					
NJD081993819	DUBOIS CHEMICALS UNION AVE & DUBOIS EAST RUTHERFORD BERGEN	NJ 003	07073		STS	N	NJ-09
NJD980505051	DUCK ISLAND SANITARY LF LAMBERTON RD HAMILTON TWP MERCER	NJ 021	08619		STS	N	NJ-04
	DUCK ISLAND RT. 29 TRENTON	NJ	08611	01			
	INTERSTATE WASTE REMOVAL			02			
NJD986574028	DUFFIELD AVENUE DUFFIELD AVENUE JERSEY CITY HUDSON	NJ 017	07306			D	NJ-14
	DUFFIELD AVENUE			01			
	HUDSON	NJ					
NJD070202611	DURABOND PRODUCTS COMPANY 1000 NOTTINGHAM WAY					N	NJ-04

REFERENCE NO. 33

CONGRESSIONAL DISTRICTS



Published by the
ELECTION DIVISION
New Jersey Department of State
CN 304
Trenton, New Jersey 08625

Thomas H. Kean
Governor

Jane Burgio
Secretary of State

CONGRESSIONAL DISTRICTS

DISTRICT ONE: **Part of Burlington County** (Maple Shade Twp., Palmyra Borough, Riverton Borough), **Part of Camden County** (Audubon Park Borough, Barrington Borough, Bellmawr Borough, Berlin Borough, Berlin Twp., Brooklawn Borough, Camden City, Chesilhurst Borough, Clementon Borough, Collingswood Borough, Gibbsboro Borough, Gloucester City, Gloucester Twp., Haddon Twp., Hi-Nella Borough, Laurel Springs Borough, Lawnside Borough, Lindenwold Borough, Magnolia Borough, Mount Ephraim Borough, Oaklyn Borough, Pennsauken Twp., Pine Hill Borough, Pine Valley Borough, Runnemede Borough, Somerdale Borough, Stratford Borough, Tavistock Borough, Winslow Twp. and Woodlynne Borough), and **Part of Gloucester County** (Clayton Borough, Deptford Twp., East Greenwich Twp., Greenwich Twp., Harrison Twp., Logan Twp., Monroe Twp., National Park Borough, Paulsboro Borough, Swedesboro Borough, Washington Twp., Wenonah Borough, West Deptford Twp., Westville Borough, Woodbury City, Woodbury Hts. Borough and Woolwich Twp.).

DISTRICT TWO: **Atlantic County, Cape May County, Cumberland County, Salem County** and **Part of Gloucester County** (Elk Twp., Franklin Twp., Glassboro Borough, Mantua Twp., Newfield Borough, Pitman Borough and South Harrison Twp.).

DISTRICT THREE: **Part Of Monmouth County** (Allenhurst Borough, Asbury Park City, Atlantic Highlands, Borough, Avon-by-the-Sea Borough, Belmar Borough, Bradley Beach Borough, Deal Borough, Eatontown Borough, Fair Haven Borough, Hazlet Twp., Highlands Borough, Interlaken Borough, Keansburg Borough, Keyport Borough, Little Silver Borough, Loch Arbour Village, Long Branch City, Manasquan Borough, Middletown Twp., Monmouth Beach Boro, Neptune City Borough, Neptune Twp., Oceanport Borough, Ocean Twp., Red Bank Borough, Rumson Borough, Sea Bright Borough, Sea Girt Borough, Shrewsbury Borough, Shrewsbury Twp., Spring Lake Borough, Spring Lake Heights Borough, South Belmar Borough, Tinton Falls Borough, Union Beach Borough and West Long Branch Borough) and **Part of Ocean County** (Bay Head Borough, Brick Twp., Dover Twp., Island Heights Borough, Lakewood Twp., Lavallette Borough, Mantoloking Borough, Point Pleasant Beach Borough, Point Pleasant Borough, Seaside Heights Borough and South Toms River Borough).

DISTRICT FOUR: **Part of Burlington County** (Bordentown City, Bordentown Twp., Burlington City, Burlington Twp., Chesterfield Twp., Eastampton Twp., Fieldsboro Borough, Florence Twp., Mansfield Twp., Springfield Twp. and Westampton Twp.), **Part of Mercer County** (East Windsor Twp., Ewing Twp., Hamilton Twp., Hightstown Borough, Hopewell Borough, Hopewell Twp., Lawrence Twp., Pennington Borough, Trenton City and Washington Twp.), **Part of Middlesex County** (Jamesburg Borough, Monroe Twp. and Plainsboro Twp.), **Part of Monmouth County** (Allentown Borough, Brielle Borough, Colts Neck Twp., Englishtown Borough, Farmingdale Borough, Freehold Borough, Freehold Twp., Holmdel Twp., Howell Twp., Manalapan Twp., Marlboro Twp., Millstone Twp., Roosevelt Borough, Upper Freehold Twp. and Wall Twp.), and **Part of Ocean County** (Jackson Twp.).

DISTRICT FIVE: **Part of Bergen County** (Allendale Borough, Alpine Borough, Bergenfield Borough, Closter Borough, Cresskill Borough, Demarest Borough, Dumont Borough, Emerson Borough, Glen Rock Borough, Harrington Park Borough, Haworth Borough, Hillsdale Borough, Ho-Ho-Kus Borough, Mahwah Twp., Midland Park Borough, Montvale Borough, Northvale Borough, Norwood Borough, Oakland Borough, Old Tappan Borough, Oradell Borough, Paramus Borough, Park Ridge Borough, Ramsey Borough, Ridgewood Village, River Vale Twp., Rochelle Park Twp., Rockleigh Borough, Saddle River Borough, Tenafly Borough, Upper Saddle River Borough, Waldwick Borough, Washington Twp., Westwood Borough, Woodcliff Lake Borough and Wyckoff Twp.), **Part of Passaic County** (Bloomingdale Borough, Haledon Borough, Hawthorne Borough, North Haledon Borough, Ringwood Borough, Wanaque Borough and West Milford Twp.), and **Part of Sussex County** (Andover Borough, Andover Twp., Branchville Borough, Frankford Twp., Franklin Borough, Fredon Twp., Hamburg Borough, Hardyston Twp., Hopatcong Borough, Lafayette Twp., Montague Twp., Newton Town, Ogdensburg Borough, Sandyston Twp., Sparta Twp., Stanhope Borough, Sussex Borough, Vernon Twp., Walpack Twp. and Wantage Twp.).

DISTRICT SIX: **Part of Middlesex County** (Carteret Borough, Edison Twp., Highland Park Borough, Metuchen Borough, New Brunswick City, North Brunswick Twp., Old Bridge Twp., Perth Amboy City, Sayreville Borough, South Amboy City, South River Borough and Woodbridge Twp.), **Part of Monmouth County** (Aberdeen Twp. and Matawan Borough), and **Part of Union County** (Linden City, Rahway City and Roselle Borough).

DISTRICT SEVEN: **Part of Essex County** (Millburn Twp.), **Part of Middlesex County** (Dunellen Borough and Middlesex Borough), **Part of Somerset County** (Bound Brook Borough, Bridgewater Twp., Green Brook Twp., Manville Borough, North Plainfield Borough, Warren Twp. and Watchung Borough), and **Part of Union County** (Berkeley Heights Twp., Clark Twp., Cranford Twp., Elizabeth City, Fanwood Borough, Garwood Borough, Kenilworth Borough, Mountainside Borough, New Providence Borough, Plainfield City, Roselle Park Borough, Scotch Plains Twp., Springfield Twp., Summit City, Union Twp., Westfield Town and Winfield Twp.).

DISTRICT EIGHT: **Part of Bergen County** (Franklin Lakes Borough), **Part of Essex County** (Part of Belleville Town, Bloomfield Town, Glen Ridge Borough, Montclair Town and Nutley Town), **Part of Morris County** (Riverdale Borough) and **Part of Passaic County** (Clifton City, Little Falls Twp., Passaic City, Paterson City, Pompton Lakes Borough, Prospect Park Borough, Totowa Borough, Wayne Twp. and West Paterson Borough).

DISTRICT NINE: **Part of Bergen County** (Bogota Borough, Carlstadt Borough, Cliffside Park Borough, East Rutherford Borough, Edgewater Borough, Elmwood Park Borough, Englewood City, Englewood Cliffs Borough, Fair Lawn Borough, Fairview Borough, Fort Lee Borough, Garfield City, Hackensack City, Hasbrouck Heights Borough, Leonia Borough, Little Ferry Borough, Lodi Borough, Lyndhurst Twp., Maywood Borough, Moonachie Borough, New Milford Borough, North Arlington Borough, Palisades Park Borough, Ridgefield Borough, Ridgefield Park Village, River Edge Borough, Rutherford Borough, Saddle Brook Twp., South Hackensack Twp., Teaneck Twp., Teterboro Borough, Wallington Borough and Wood-Ridge Borough, and **Part of Hudson County** (East Newark Borough, Part of Kearny Town, and Secaucus Town).

DISTRICT TEN: **Part of Essex County** (Part of Belleville Town, East Orange City, Irvington Town, Newark City and Orange City, and **Part of Union County** (Hillside Township).

DISTRICT ELEVEN: **Part of Essex County** (Caldwell Borough, Cedar Grove Twp., Essex Fells Borough, Fairfield Borough, Livingston Twp., Maplewood Twp., North Caldwell Borough, Roseland Borough, South Orange Village, Verona Borough, West Caldwell Borough and West Orange Town), **Part of Morris County** (Boonton Town, Boonton Twp., Butler Borough, Chatham Borough, Chester Borough, Chester Twp., Denville Twp., Dover Town, East Hanover Twp., Florham Park Borough, Hanover Twp., Jefferson Twp., Kinnelon Borough, Lincoln Park Borough, Madison Borough, Mendham Borough, Mendham Twp., Mine Hill Twp., Montville Twp., Mountain Lakes Borough, Mount Arlington Borough, Mount Olive Twp., Netcong Borough, Parsippany-Troy Hills Twp., Pequannock Twp., Randolph Twp., Rockaway Borough, Rockaway Twp., Roxbury Twp., Victory Gardens Borough and Wharton Borough), **Part of Sussex County** (Byram Twp. and Green Twp.) and **Part of Warren County** (Allamuchy Twp., Frelinghuysen Twp., Independence Twp. and Liberty Twp.).

DISTRICT TWELVE: **Hunterdon County, Part of Mercer County** (Princeton Borough, Princeton Twp. and West Windsor Twp.), **Part of Middlesex County** (Cranbury Twp., East Brunswick Twp., Helmetta Borough, Milltown Borough, Piscataway Twp., South Brunswick Twp., South Plainfield Borough and Spotswood Borough), **Part of Morris County** (Chatham Twp., Harding Twp., Morris Plains Borough, Morristown Town, Morris Twp., Passaic Twp. and Washington Twp.), **Part of Somerset County** (Bedminster Twp., Bernards Twp., Bernardsville Borough, Branchburg Twp., Far Hills Borough, Franklin Twp., Hillsborough Twp., Millstone Borough, Montgomery Twp., Peapack-Gladstone Borough, Raritan Borough, Rocky Hill Borough, Somerville Borough and South Bound Brook Borough), **Part of Sussex County** (Hampton Twp. and Stillwater Twp.) and **Part of Warren County** (Alpha Borough, Belvidere Town, Blairstown Twp., Franklin Twp., Greenwich Twp., Hackettstown Town, Hardwick Twp., Harmony Twp., Hope Twp., Knowlton Twp., Lopatcong Twp., Mansfield Twp., Oxford Twp., Pahaquarry Twp., Phillipsburg Town, Pohatcong Twp., Washington Borough, Washington Twp. and White Twp.).

DISTRICT THIRTEEN: **Part of Burlington County** (Bass River Twp., Beverly City, Cinnaminson Twp., Delanco Twp., Delran Twp., Edgewater Park Twp., Evesham Twp., Hainesport Twp., Lumberton Twp., Medford Lakes Borough, Medford Twp., Moorestown Twp., Mount Holly Twp., Mount Laurel Twp., New Hanover Twp., North Hanover Twp., Pemberton Borough, Pemberton Twp., Riverside Twp., Shamong Twp., Southampton Twp., Tabernacle Twp., Washington Twp., Willingboro Twp., Woodland Twp. and Wrightstown Borough), **Part of Camden County** (Audubon Borough, Cherry Hill Twp., Haddonfield Borough, Haddon Heights Borough, Merchantville Borough, Voorhees Twp. and Waterford Twp.), and **Part of Ocean County** (Barnegat Light Borough, Barnegat Twp., Beach Haven Borough, Beachwood Borough, Berkeley Twp., Eagleswood Twp., Harvey Cedars Borough, Lacey Twp., Lakehurst Borough, Little Egg Harbor Twp., Long Beach Twp., Manchester Twp., Ocean Gate Borough, Ocean Township, Pine Beach Borough, Plumsted Twp., Seaside Park Borough, Ship Bottom Borough, Stafford Twp., Surf City Borough and Tuckerton Borough).

DISTRICT FOURTEEN: **Part of Hudson County** (Bayonne City, Guttenberg Town, Harrison Town, Hoboken City, Jersey City, Part of Kearny Town, North Bergen Twp., Union City, Weehawken Twp. and West New York Town).

Published by: ELECTION DIVISION, NEW JERSEY DEPARTMENT OF STATE
CN 304 Trenton, New Jersey 08625

January 1987

ATTACHMENT 3

SITE ASSESSMENT PHASES

1. PRELIMINARY ASSESSMENT/RCRA PRELIMINARY ASSESSMENT

   * Quick, Low Cost Review of Readily Accessible Records and Reports

   * Undertaken to Determine the Existence of a Problem and the Need for Further Action at a Site by Characterizing:
     - Magnitude of the Hazard
     - Source and Nature of the Release or Potential Release
     - Identity of Potentially Responsible Party(s) (PRP)

   * Does Not Include On-Site Visits or Sample Collection

2. SITE INSPECTION

   * The Purpose of the Site Inspection is to:
     - Determine the Necessity of Further Action
     - Further Define and Characterize the Problem
     - Provide Data for the Hazard Ranking System (HRS) Scoring and Compute Initial Score

   * The Site Inspection Involves an On-Site Visit and Sampling (10+/- Samples)

   * A Site Inspection is not an Extent of Contamination Study

   * A Site Inspection Avoids Use of More Sophisticated Analysis
     - Geophysical Survey

3. SITE INSPECTION PRIORITIZATION

   * Quick, Low Cost Review of Readily Accessible Records and Reports

   * Undertaken to Determine the Validity and Update Background Conditions Under the New HRS Model, and the Need for Further Action at a Site by Characterizing:
     - Magnitude of the Hazard
     - Source and Nature of the Release or Potential Release

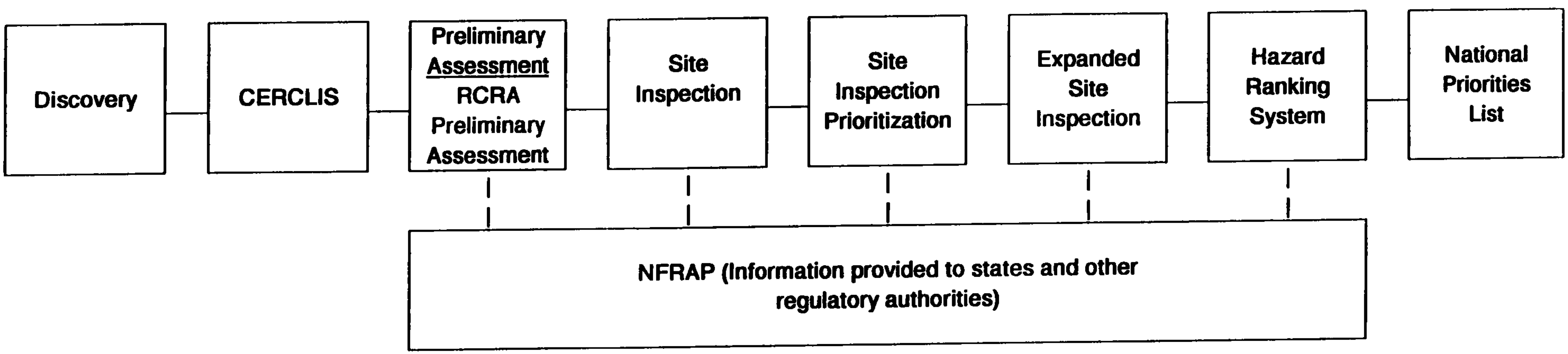
   * Included On-Site Visits or Sample Collection
     - Analyze Samples/Limited Analytical Resources
     - Account for Significant Safety Hazards On-Site

4. EXPANDED SITE INSPECTION

   A Follow-Up Inspection May Be Recommended After the SI To:

   * Gather Additional Data Necessary to Strengthen or Substantiate the Initial HRS Score
     - Geophysical Surveys
     - Installation of Groundwater Monitoring Wells
     - Additional Sampling

SITE ASSESSMENT PHASES



Review of Analytical Data

If previous analytical data are available, they should be reviewed for information which supports the design of the sampling and analysis program, tests site hypotheses, and documents the site score. The SI investigator should review all previous analytical data. While analytical data collected for other purposes may not meet SI objectives, site-specific analytical data are generally helpful in better understanding the nature of the problem at the site, regardless of data sources or data quality. The depth of the review depends on the overall quality and quantity of data, the intended use of the data, and whether they are representative of current site conditions and comparable to SI data. Determining whether available data can be applied as SI-generated data requires the professional judgement of an experienced reviewer. Both validated and non-validated analytical data may be available. Previous SI data will be validated and of CLP-quality. Non-validated data may contain false positives and false negatives, as well as quantitation, transcription, and calculation errors. If data of unknown or questionable quality are used for decision-making, the investigator should review all available information to assess the level of certainty associated with the data. If these data are used for HRS documentation, data validation may be necessary. The investigator may be able to determine the general quality of the data set by reviewing QC data. False positives can occur when blanks are contaminated or spike recoveries are very high. False negatives can occur if spike recoveries are very low. If hazardous substances are found in one duplicate but not the other, results may be false positive or negative.